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THE IRON AGE

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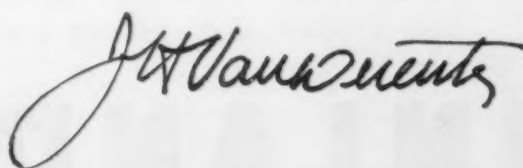
Vol. 144, No. 26

Happy New Year!

OLD customs have a strong hold in America, which is an excellent thing for the preservation of Democracy. And one of the oldest customs which is so deeply ingrained in humanity that it has out-lived even the fallen democracies is the habit of wishing your neighbors well on New Year's Day.

So on this occasion, in the last issue of The Iron Age to appear in 1939, we extend our best wishes for happiness and prosperity during 1940 to our ever growing family of readers and advertisers. We appreciate the business, personal or corporate, that you have seen fit to transact with us, but more than this we appreciate and value the "plus" of friendship which goes far beyond a business transaction and that is so evident in your contacts and correspondence with us. We hope that we shall continue to deserve your friendship and will make that our principal objective for 1940.

We would have liked to send each one of you a personal greeting card, but since that, of course, is impossible, please accept this expression of our good will and best wishes. "May you live long and prosper."





ORE FOR THE HEARTHS OF INLAND

Butting through cold, gray seas, Inland's fleet of ore boats plied its way this year until ice closed the lakes' highway. They have laid up huge stocks of ore at Indiana Harbor—an ample winter's supply for Inland's battery of modern blast furnaces. This is typical of the manner in which In-

land is using, to capacity, every unit of its facilities—every resource of its man power—to satisfy the urgent needs of Inland's customers. Nor is mere tonnage enough; Inland products—as always—will meet the same high standards of quality that users have learned to expect from Inland.

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CUPOLA POSSIBILITIES AND LIMITATIONS *For Making* HIGH-STRENGTH IRON

By H. W. GILLET and C. H. LORIG
Battelle Memorial Institute

THE signs of the times indicate that the foundryman will be under increasing customer pressure to supply high-strength, i. e., "high-test" and alloy irons. Or, if this phraseology is not agreed with, it perhaps could be stated that the foundryman who can produce high-strength irons has a product which he can merchandise, one that opens up a field of service that cannot be entered by the foundryman who can make nothing but soft gray iron.

It has been estimated¹ that 10 per cent of the total American gray iron output of 1937 was alloyed. And it might be expected that an equal amount of unalloyed high-strength iron was produced. Every sign, including the hearty reception given the American Foundrymen's Association Handbook on Alloy Cast Iron, leads to the conclusion that, and very soon, somewhere between one-fourth and one-third of the gray iron output will be some variety of high-strength iron. The attention being given in England² to "high duty" iron, as it is there termed, is an additional straw in the wind. The foundryman who can only supply the garden varieties of iron will find his

THE authors point out the growing demand for high-strength iron and devote a great deal of attention to the making of a good base iron, discounting at the same time the frequent efforts on the part of foundrymen to make a poor iron into a fair one by means of alloys. A great deal of data is given on the new material Fer X as a means of permitting the smaller founder to economically produce high-strength irons. These data were all originally presented by the authors in the recent Chicago regional conference of the American Foundrymen's Association.

sales outlets progressively restricted. It is time right now for individual foundrymen to consider how they can produce high-strength iron and lay definite plans for its production before they wake up to find their market gone. Most customers who want both common and high-strength irons for different purposes will favor that producer who can supply all their casting needs rather than only a part of them.

High-strength iron may be defined as A.S.T.M. Class 40 iron, i. e., that which, in a 1.2-in. arbitration bar, shows 40,000 lb. per sq. in. tensile

strength or more, with the "or more" going up to 60,000 and perhaps higher.

In the production of high-strength cast iron, as of any other product, the cost is made up of two factors—raw materials and conversion costs. What is wanted is the lowest *total* cost. With prices of raw materials fluctuating as they do, it is advisable to have techniques at hand suited to different types of raw materials, so that a shift may be made at short notice to the combination of material and technique that is most economical.

However, one of the items in conversion costs is interest and amortization on equipment installed to give this flexibility but held idle in periods when its use is not economical.

The foundry desiring to make high-strength gray iron has several recognized choices of doing it, e. g., (1) in the cupola by holding carbon and silicon at the necessary low levels, (2) by alloying additions to a weak iron, (3) by cold melting in or (4) by duplexing to an electric, an air furnace, or some equivalent. Each of these is commercially used.

Technically, the electric melting methods are the most easily controlled and, since they allow use of large proportions of cheap borings and turnings, the economics are very attractive whenever reasonable power rates can

¹ R. C. Stanley, Annual Report, International Nickel Co. of Canada for 1938.

² J. G. Pearce, First Report Research Committee on High-Duty Cast Irons for General Engineering Purposes, Institute of Mechanical Engineers, Session of Dec. 16, 1938, Advance Copy.

be had, and the furnace can be kept busy. However, the first cost of an electric equipment is rather high so that interest charges pile up in idle periods, and this is aggravated by the demand charge for power which makes the conversion cost rise steeply when the electric unit is intermittently operated. Many foundrymen have therefore had to forego the convenience of an electric unit because there is insufficient assurance that it can be kept busy.

On the other hand, captive foundries in large production with an assured output have shown great ingenuity in developing some of the more difficult techniques that can, with enough supervision, be made to give very low conversion cost.

The jobbing foundryman who is just breaking into the high-strength cast iron field is betwixt and between. He is not assured of a steady enough market to justify either buying an electric unit, or of developing the technique and control characteristic of the large captive foundries making non-alloyed high-strength irons. His usual way out of the dilemma is to use his regular soft iron and load it up with alloys till it meets the high-strength specifications. *This is an uneconomical use of alloys.* As has been stated in the A.F.A.-A.S.T.M. Symposium³, "Alloys should be added to a good base iron and not used in an attempt to make a poor iron into a fair one."

In theory, at least, the duplexing principle should be applicable to the making of high-strength iron, either for use as is, or for economical alloying to make still better irons, and without the necessity of expensive equipment. It is this possibility that will be explored to some extent in the following paragraphs.

High-strength iron has already been defined as that of A.S.T.M. Class 40, i. e., that which gives 40,000 tensile in a 1.2-in. bar. Chemically, in unalloyed iron, this means metal of about 3.00 per cent total carbon, 1.75 per cent silicon, with the silicon of course varied according to section, and with some of the silicon used as an inoculating ladle

addition in order to produce "normal" iron, with the proper structure.

It is possible to make stronger unalloyed iron by cutting the carbon still more, and a further reduction of carbon and a different adjustment of silicon are made for pearlitic malleable, say 2.75 per cent carbon; regular malleable, say 2.50 per cent carbon; and super-strength malleable, say 2 per cent carbon; and together with suitable alloy additions for the Ford family of alloys at say 1.50 per cent carbon.

Unless some sort of malleabilizing heat-treatment is to be applied, it is probably not wise to overstep the sensible mean and try to force the base iron to too high a strength. The super-strength unalloyed irons have greater shrinkage, higher melting points, and poorer castability. They offer more difficulty in getting sound castings. Since the real problem is production of castings, not test bars, taking the carbon and silicon down to the lowest possible level that will give gray castings is not necessarily the best answer. Morken⁴ calls such iron "tricky."

It is possible to play the upper part of the carbon scale on the cupola, but the further down on the scale the sourer the notes are likely to be. Nevertheless, Judson⁵ regularly makes hard iron of 2.40 per cent carbon, 1.35 per cent silicon in one cupola for mixing with soft iron from another cupola to produce a final mix of about 2.75 per cent carbon, 1.60 per cent silicon for heavy castings. MacPherran⁶ regularly produced metal under 3.00 per cent carbon from the cupola. Smalley⁷ also reports such cupola iron. In all these cases, the cupola charge is very high in steel scrap. There is no doubt at all that metal of the 2.80-3.10 per cent carbon range desired for high-strength iron to be cast gray can be obtained from the cupola, and cupola malleable is regularly made at this carbon level.

Neither is there any doubt that it is a tough job to make the cupola consistently produce these low carbons and at the same time produce sufficiently hot metal. Since the cupola melts the metal in contact with the coke, carbon is inevitably picked up to some level governed by the metal charge, the coke, and the mode of operation of the cupola. These factors can be more readily controlled to give the combination of hot metal and small fluctuation from the carbon level aimed at, if this level is set at, say, 3.30 per cent carbon rather than 3 per cent. It might be said that the average cupola under average operation is more "contented"

when it "gives down" 3.30 per cent carbon.

Cupola Cheapest Method

The silicon level must be held low enough so that the final "inoculating" addition can be made. The minimum addition is generally around 0.25 per cent. Hence, the problem may be phrased as the production of molten iron of 3.00 per cent carbon and 1.50 per cent or less silicon, at a high enough temperature level to take up the addition and allow plenty of time for pouring. The desire is to do as much as possible in the cupola because that is the cheapest melting method considering both first cost of equipment and fuel consumption. Hence, a still more precise phrasing of the problem is, the adjustment of cupola metal to the desired carbon and silicon level. By using a charge high in steel, the silicon can be kept low and the desired silicon added at a later stage, in which case the problem is merely one of lowering carbon from 3.30 to 3 per cent. This can be done either by oxidation of one-tenth of the carbon, or by about 10 per cent dilution with molten low carbon steel.

If the desire is to divert a part of the regular soft iron of say 3.40 per cent carbon, 2.20 per cent silicon for use as a base for alteration to the high-strength composition, a large dilution would be required to bring the silicon where it is wanted, so it will be sensible to oxidize part of the silicon before dilution.

These paragraphs have contained some glib talk about oxidizing carbon or silicon in these two cases, as if such oxidation would not adversely affect quality, a matter that requires proof.

Yet the mere fact that the raw material has at some time been subjected to strongly oxidizing conditions need not mean that the final product is any the worse. Actually, all iron starts out as iron oxide in ore, and all steel made with blast furnace metal in the charge must be severely oxidized to burn out the carbon in the pig iron. Foundrymen know that converter steel is cupola metal oxidized in most drastic fashion before final deoxidation, yet well made converter cast steel is very good stuff. Indeed, a vigorous boil is good medicine for most cast ferrous products. There is as much reason to expect benefit as harm from an oxidizing step in production.

At any rate, when the melt is gotten to the chemical composition desired, the first step has been taken toward putting it in proper shape for casting. Given the desired chemistry, the metal-

³ Symposium on Cast Iron, American Society for Testing Materials, 1933.

⁴ C. H. Morken, "Some Engineering Aspects of Cast Iron," Mechanical Engineering, Vol. 61, June, 1939, p. 455-459.

⁵ H. H. Judson, "High-Test Iron for Pressure Castings," Transactions of American Foundrymen's Association, Vol. 40, 1932, pp. 153-163.

⁶ R. S. MacPherran, "High-Test Cast Iron," Transactions of American Foundrymen's Association, Vol. 37, 1929, pp. 495-500.

⁷ O. Smalley, "High-Test Cast Iron," Transactions of American Foundrymen's Association, Vol. 37, 1929, pp. 485-494.

lurgist can usually find out how to put on the finishing touches.

In large scale operation, the composition of cupola metal is satisfactorily adjusted through an oxidizing step. Malleable⁸ has been made by blowing part of a cupola charge and mixing the blown metal with unblown metal and slightly superheating in an electric. The Ford 1.50 per cent carbon metal for brake drums is to be made at Campbell, Wyant & Cannon.

It is not necessary to use a converter, as the same reaction can be brought about with solid iron oxide. Kinnear⁹, following earlier published suggestions of Hall¹⁰, and unpublished suggestions of Melmoth and Batty, duplexed cupola melts from all-steel charge down to cast steel composition by oreing down in the basic electric. He saved half the electric energy required for a cold melt, doubled the furnace output and made good grade B steel. Such steel practice calls for desulphurizing the cupola metal, but that is no trick nowadays.

To check the feasibility of dropping carbon from the composition which a cupola will readily "give down" from an all-steel charge, a 300 lb. melt of 3.34 carbon, 0.21 silicon, 0.22 manganese, 0.05 phosphorus, 0.10 per cent sulphur was made in a basic lined induction furnace. With the metal at 2800 deg., 6.85 lb. of mill scale was added over a period of 26 min. When the boiling stopped, a sample analyzed 3.04 carbon, 0.04 silicon, 0.07 per cent manganese. Additions of ferrosilicon, calculated for 1.75 per cent silicon, and ferromanganese, calculated for 0.50 per cent manganese, were made. A sample taken after the additions had become diffused showed 2.98 carbon, 1.79 silicon, 0.63 manganese, 0.042 phosphorus, 0.084 per cent sulphur. One ladle was poured from the furnace at once, another after holding 5 min. and a third after 10 min., because, from the work of Crosby and Herzog¹¹ and other similar data, there was fear that the addition of all the silicon to

the ladle would not be effective. In all cases, the metal was poured at 2600 deg. into $\frac{7}{8}$ -in., 1.2 and 2-in. test bars. The mechanical properties are shown in Table I and Fig. 1. All bars were sound. Fig. 2 shows the structure. The only difference from other irons of similar structure and compo-

of pig iron to steel or to some intermediate carbon content, that at the temperature of cupola metal, the silicon and manganese have to be removed quite completely before the carbon is attacked. That is, the more readily oxidizable silicon and manganese protect the carbon.

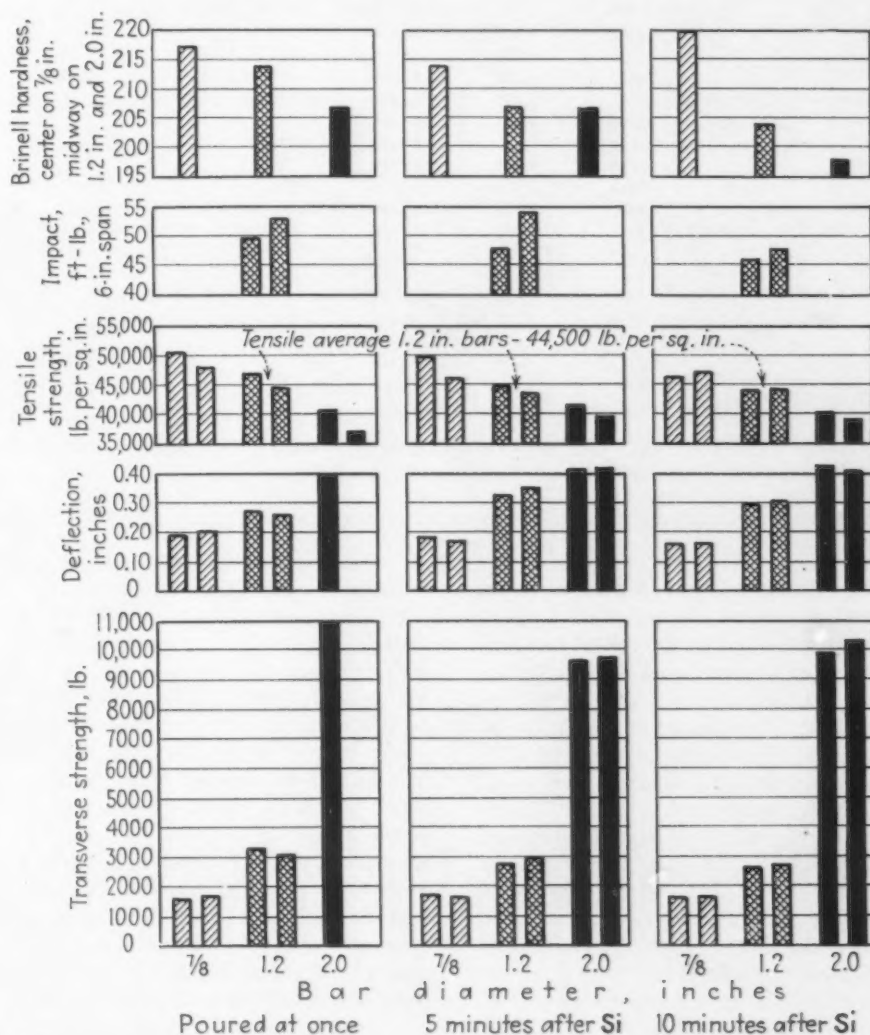


FIG. 1—Physical properties of iron after reduction of carbon by solid iron oxide. Chemical analysis: 2.98 C, 1.79 Si, 0.63 Mn, 0.042 P, and 0.084 S.

sition was that the fracture was a bit more shiny and more nearly black instead of the usual gray, which is probably ascribable to the nice arrangement of the graphite flakes. With all 1.2-in. bars running between 43,500 and 46,800 lb. per sq. in. tensile and the 2-in. bars between 36,200 and 41,900, as shown in Fig. 1 and Table I, and with the structure as shown in Fig. 2, it is clear that this heat is the desired Class 40 high-strength iron and that the silicon addition behaved all right, with ample time for pouring. Thus, reduction of carbon by solid iron oxide has possibilities.

It is fundamental in the oxidation

Handling, in this way, an initially soft iron, higher in both carbon and silicon than is desired, so as first to remove most of the silicon, and then the desired amount of carbon, is therefore not feasible. Oxidation of silicon only, followed by dilution of the melt with molten steel may, however, be resorted to. Initial adjustment of the charge to give the desired silicon, followed by duplexing in the electric where a 10 per cent steel addition is made for dilution, has been described for malleable and high-strength iron by Morrison¹², by Bremer¹³ and by Moore¹⁴. Their requirements for added heat over that of the incoming cupola

⁸ H. A. Schwartz, "Malleable Made by Triplex Process," Foundry, Vol. 48, 1920, pp. 815-817, 1925.

⁹ H. B. Kinnear and H. W. Gillett, "Cupola Hot-Metal Duplexing for the Electric Steel Foundry," Metals and Alloys, Vol. 7, December, 1936, pp. 301-308.

¹⁰ J. H. Hall, "The Steel Foundry," 1914, p. 188.

¹¹ V. A. Crosby and A. J. Herzog, "Late Silicon Additions to Cast Iron," Foundry, Vol. 66, January, 1938, pp. 23-29, 73.

¹² C. Morrison, "Duplexing of Malleable Cast Iron," THE IRON AGE, Vol. 133, June 7, 1934, pp. 19, 76, 80.

¹³ E. Bremer, "Superheats and Refines Gray Cast Iron," Foundry, Vol. 64, 1936, pp. 26-27, 67.

¹⁴ W. E. Moore, "The Electric Furnace in the Cast Iron Industry," Transactions of Electrochemical Society, Vol. 61, 1932, pp. 193-201.

TABLE I

Mechanical Properties of Iron Containing T.C. = 2.98, 1.79 Si, 0.63 Mn, 0.042 P, 0.084 S,
Obtained by Mill Scale Oxidation of an Initial 3.34 C, 0.21 Si, 0.22 Mn Iron.
Final Additions of 1.75 Si, 0.50 Mn.

Poured from Ladle	Size of Bar, In.	Transverse Test, Cor- rected Break- ing Load, Lb.	Corrected Deflection, In.	Tensile Strength, Lb. Per Sq. In.	Brinell Hardness, Center	Brinell, Midway Between Center and Outside	Impact, 6-In. Span, Ft.-Lb.
1	7/8	1765	0.194	50,200			
		1820	0.200	48,000	217		
		3300	0.376	46,800			49.5
1	1.2	3020	0.362	44,600	217	214	53.0
1	2	10,920	0.397	40,600			
				36,200	204	207	
2	7/8	1760	0.183	50,000			
		1690	0.174	46,750	214		
		2890	0.325	44,800			48.0
2	1.2	2980	0.356	43,500	207	207	54.0
		9750	0.413	41,900			
2	2	9800	0.422	39,600	207	207	
		1630	0.164	46,500			
3	7/8	1650	0.163	47,000	220		
		2770	0.298	44,000			46.0
		2755	0.301	44,250	201	204	48.0
3	1.2	9900	0.424	40,300			
3	2	10,320	0.410	39,400	199	197	

NOTE: Ladle 1 was poured just after the silicon addition; ladle 2, 5 min. after silicon addition; and ladle 3, 10 min. after the silicon addition.

charge range from 55 to 110 kwhr. per ton, so something of this order must be added in non-electric practice.

At first sight this seems a tough nut to crack. However, there is a way to crack it. The reader is probably familiar with thermit welding, and thermit steel could conceivably be used. Actually, aluminum is rather expensive fuel, and an excess of aluminum carried into the iron might not be healthy for it. Udy, of the Chromium Mining & Smelting Corp., has proposed the use of silicon thermit, since an excess of silicon left over from the reaction is compatible with cast iron,

and such an addition can be allowed for. This material is being studied at Battelle. Instead of using iron oxide and aluminum as the heat-generating agents, as is done in aluminothermics, sodium nitrate and ferrosilicon are used. Just as in the converter, silicon is oxidized before the iron, forming silica which is fluxed by the sodium oxide from the nitrate. If desired some lime may be added as a further flux. The reaction generates enough heat to melt cast iron chips or steel clippings almost instantaneously. The iron of the ferrosilicon plus that in the chips or clippings is thus supplied

molten and at a high temperature. The mixture of nitrate, ferrosilicon and metal to be melted is termed "Fer X."

Fer X Is Temperature Addition

This method can be seen to be a sensible one if the heat of oxidation of silicon is recalled. About 0.08 lb. of silicon is required to produce 1 lb. hot molten steel. The heat of combustion of that amount of silicon is equivalent to about 0.215 kwhr. Therefore, if 200 lb. of iron is added from Fer X to 1800 lb. molten cast iron, in the process heat is generated equivalent to 43 kwhr., but since the heat is generated in place and almost instantaneously, the efficiency will be higher than that of the utilization of an equal number of kwhr. in the electric furnace, and the Fer X addition should be as effective as the use of 75 kwhr. in an electric furnace. If the Fer X is added in a heated forehearth, its action should be approximately equivalent to that of the usual electric duplexing method of dilution with cold steel.

Until the chemists solved the problem of nitrogen fixation so that the price of sodium nitrate came down, it would have been uneconomic to attempt to exploit this reaction. Under present conditions it affords a means of making what might be termed "a ladle addition of temperature," if the melt it produces is calculated for the same composition as the melt to which it is added, or simultaneously, of temperature and a low carbon melt for dilution. The silicon of the dilution addition can be kept low, or the desired final addition of silicon can be made simultaneously in the molten state by adjusting the Fer X composition to have excess silicon. A trial of this method gave the following results:

A 100-lb. heat consisting of three-fourths briquetted borings, one-fourth heavy scrap was melted down in the basic induction furnace to a calculated composition of 3.35 per cent carbon, 2.30 silicon, 0.70 manganese, 0.10 sulphur and 0.18 phosphorus. It was treated with 1 lb. soda ash and the slag removed. Mill scale was then added, calculated to reduce silicon to 1.65 per cent slag removed. Fer X was then added for dilution of carbon and silicon to 3 per cent carbon, 1.50 silicon, and a final inoculating addition of 0.25 per cent silicon as ferro was made. After holding 3 min., a set of 7/8, 1.2 and 2-in. test bars was poured, and after 10 min. more, another set of 1.2-in. bars was poured. The metal was kept at 2850 deg. to 2650 deg. during the half hour used in

TABLE II

Mechanical Properties of Iron Containing T.C. 2.96, 1.73 Si, 0.55 Mn, 0.18 P, 0.03 S,
Obtained by Soda Ash, Mill Scale and Fer-X Treatment of an Initial 3.35 C,
2.30 Si, 0.70 Mn, 0.18 P, 0.10 S Iron, with Final Addition of 0.25 Per Cent Si.

Poured from Ladle	Size of Bar, In.	Transverse Test, Corrected Breaking Load, Lb.	Corrected Deflec- tion In.	Tensile Strength, Lb. Per Sq. In.	Brinell Hardness— Midway Between Center and Outside
1	7/8	1600	0.160	51,150	241
				51,200	
1	1.2	2880	0.228	47,100	223
		2970	0.260	47,200	223
1	2	10,550	0.301	39,800	207
				43,100	217
		2620	0.193	45,500	232
2	1.2	2660	0.210	46,000	232

NOTE: Ladle 1 was poured 3 min. after the silicon addition; ladle 2 after a further 10 min.

applying the various treatments by the application of power as needed. Both ladles were poured at 2550 deg.

The finished iron analyzed 2.96 per cent carbon, 1.73 silicon, 0.55 manganese, 0.03 sulphur and 0.18 phosphorus. The properties are shown in Table II.

The structure of the metal from the first ladle is shown in Fig. 3. The fracture of this metal was normal. That from the second showed a trace of a tendency toward modification, but

con, which was white in the second ladle poured. Correcting the aim by the experience on the first shot, the bird was hit with the second barrel. There seems to be no reason why pearlitic malleable cannot be made and even regular malleable from soft iron by these reactions. The next question is whether it is worth while to make high strength or special irons in either of the two ways outlined.

Since the tests indicate that the methods suggested are not entirely im-

the cost of molten metal before it went into the molds.

Shrewd purchase of scrap, taking back from their own customers borings whose composition is known, intelligent mixing of the metals with adequate chemical control, or use of secondary ingot into whose preparation these factors have entered, cut a big slice off the cost of the charge. When aluminum borings are run down into ingot and the aluminum content goes down and the alloy con-



FIG. 2—Structure of high-strength iron after reduction of carbon by solid iron oxide.

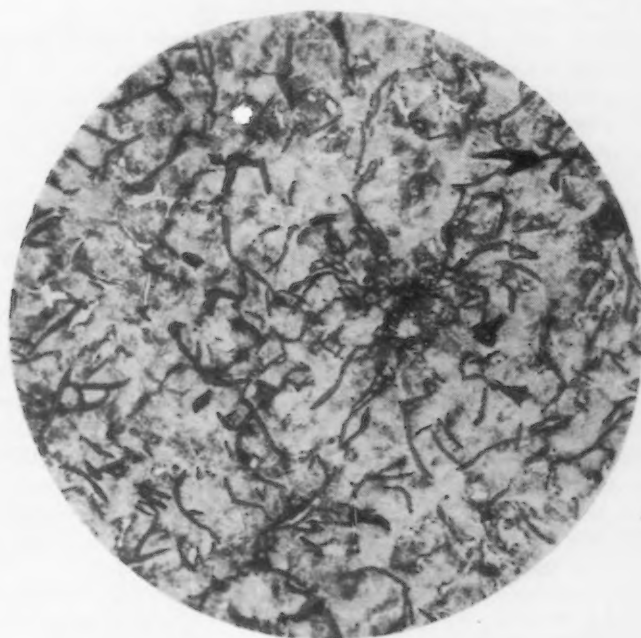


FIG. 3—Structure of high-strength iron obtained by soda ash, mill scale and Fer X treatment, with a final addition of 0.25 Si.

the mechanical properties show the second ladle still high-strength iron, so that pouring time should be ample.

The four 1.2-in. bars from this heat ran between the close limits of 45,500 and 47,200 lb. per sq. in. tensile, averaging about 46,500. The requirement of 40,000 lb. per sq. in. iron has been exceeded, starting with a soft iron melt that was three-fourths briquetted borings. The test does not prove that cupola metal and a heated forehearth would be as easy to handle, but it does indicate that the chemistry of the process does work. A suitable heated forehearth would have to be designed. It will also be necessary to work out chill tests or other rapid tests by which the composition can be checked at various stages in the process, until the procedure has become routine. In a first attempt the oreing down and dilution were overdone, and the result was a metal of 2.44 carbon, 1.56 sili-

con, which was white in the second ladle poured. Correcting the aim by the experience on the first shot, the bird was hit with the second barrel. There seems to be no reason why pearlitic malleable cannot be made and even regular malleable from soft iron by these reactions. The next question is whether it is worth while to make high strength or special irons in either of the two ways outlined.

Since the tests indicate that the methods suggested are not entirely im-

practical, consideration may be given to how much it would cost to make high-strength iron in such ways. It would be nice if a definite figure could be set for the cost of ordinary soft cupola iron in the ladle as a basis of comparison. Actually, this varies greatly with the charge and the cost of the charge varies greatly with the location and the date. In this connection, it would be of interest to digress briefly to consider some possibilities of savings by selection of the cupola charge. Most of the readers know old timers who made money on brass and aluminum castings, not because they were outstanding in their molding practice nor because they were better salesmen than their fellows, but primarily because they were skilled in utilizing scrap and in handling their melting practice. The one point in which their cost ran under the other fellow's was

tent up, the foundryman "sweetens" the ingot with sheet clippings. Use of electric furnaces where avoidance of oxidation and volatilization losses made it thoroughly economical to do so, or in the case of some bearing metals, of cupola melting when volatilization was no problem, or where it even allowed the use of zinc-containing scrap that could be bought cheaper than zinc-free scrap, made another saving. When materials as expensive as copper-base and aluminum-base alloys are being dealt with, these savings are not neglected, and any neglect sticks out like a sore thumb and is likely to result in a change of superintendents.

The refiner of secondary metals has taken a good deal of the burden off the shoulders of the non-ferrous superintendent, but it is rare indeed that an analogous service is rendered in supplying pedigreed scrap for cupola

charges. Yet possibilities exist for analogous savings so far realized in electric melting but not widely realized for other melting media.

Since the electric furnace operates under non-oxidizing conditions, iron chips or steel turnings or sheet clippings can be employed, either as part of the charge in a cold melt or as an addition in duplexing hot metal in the electric furnace. Loose borings are not good charge material for any fuel-fired furnace, and it is the ability to use cheaper raw materials than other furnaces that gives the electric unit an economic advantage to offset the higher cost of electric heat. Loose borings are even less usable in the cupola than in other fuel-fired furnaces; they not only oxidize but they clog the draft.

Nevertheless, clean, unrusted borings, if solidly briquetted under heavy enough pressure, stay together in the cupola and melt down like pieces of solid scrap. If they are only loosely pressed, briquettes disintegrate in the cupola and are as troublesome as loose chips are. This is no new doctrine. Rayner¹⁵ discussed the advantages of high-pressure briquetting before the A.F.A. in 1930, stating that, including overhead and amortization, he briquetted borings for \$3.25 per ton, using a \$60,000 press. In discussion, Walls said he had done it for \$1.91 a ton. Producers of briquetting presses claim it can be done with steady operation for \$1.50 on cast iron borings and under \$2 on steel turnings. One user is said to have made savings equal to the cost of the press in eight months. From user experience, it appears that \$2 on borings is a fair figure.

The first cost of the press, some \$40,000, requires that the press be kept busy in order to amortize that cost, and the small jobbing shop obviously can't put up the money for such an expenditure. But why doesn't some enterprising scrap dealer put in a press, collect borings or turnings right at the machines in the machine shop where they are produced, apply suitable precautions against rusting so that the composition of a given lot is known, and the borings are kept unrusted, take them to the press, briquet them, and then sell these pedigreed briquettes of cast iron or steel at a price that will give him a profit and make a real saving over heavy scrap or steel rails? Or, why don't a few foundries get together and operate a press to serve the whole group?

¹⁵ H. Rayner, "Briquetting Cast Iron Borings for Use in the Cupola," Transactions of American Foundrymen's Association, Vol. 38, 1930, pp. 460-466.

TABLE III

Scrap Prices Per Gross Ton Delivered to Consumers, Chicago District

	September	Borings	No. 1 Cast	Spread	Turnings	No. 1 Steel	Spread
Average	1939	\$8.95	\$14.71	\$5.76	\$8.95	\$16.07	\$7.12
Average	1938	5.78	12.02	6.24	6.27	12.53	6.26
Average	1937	10.49	15.29	4.80	9.81	17.21	7.40
Average	1936	7.75	13.26	5.51	7.50	14.72	7.22
Average	1935	6.04	10.74	4.70	6.22	11.53	5.31
Average	1934	6.18	9.07	2.89	5.93	10.18	4.25
Average	1933	4.92	8.21	3.29	4.73	8.02	3.29
Average	1932	3.75	6.82	3.08	3.03	6.03	3.00

It will be noted that even in the deepest of depression when heavy scrap is almost given away, borings and turnings are also at a very low level, but the spread is even then of the same order as the briquetting cost, which may be taken as \$2 per gross ton on borings and \$2.25 per gross ton on turnings. As times get better, the levels rise and the spread increases to two or three times the briquetting cost.

It could be considered that the Chicago 1937 and 1938 averages are more or less representative, in 1937 of a relatively good, active year, and in 1938 as of a pretty bad one.

When a preliminary draft of this paper was made early in June, pig iron, short rails, cast iron scrap, cast iron borings and steel turnings had all had nine months of almost complete price stability. Costs could apparently be figured with some assurance that they meant something. The events of the fall turned this all topsy-turvy, so that at any one production center the cost ratios of the various raw materials fluctuated wildly. In different localities, the spread between borings and turnings and heavy scrap was variously affected. For example, consider Nov. 7 quotations in Tables III and IV.

Such figures naturally create the inquiry as to why everyone is not doing what a few are doing successfully in the use of briquetted borings for soft iron. Briquetted steel turnings instead of short rails for a high steel cupola charge offer equal or greater opportunity for savings.

It would appear that with the use of briquetted chips or turnings, the average cost of cupola-melted molten soft iron or of a high steel charge in the ladle in the Chicago district might have been under \$13 per ton in 1938 and around \$15 to \$16 in 1937, including raw materials and cupola conversion costs. Such figures might be used as more or less representative, attainable base line costs from which to

calculate the cost of high-strength iron. But, instead of calculating on the basis of a fluctuating base line, the figuring could be confined to how much it should cost to convert cupola metal of some specific composition into a high-strength composition. In other words, whatever the cost of soft iron in the ladle is, try to approximate how many dollars per ton must be added to that cost when making a 40,000 lb. per sq. in. tensile iron.

Case A—Alloy Iron

Soft iron, alloyed from a normal charge, with a 25 per cent steel addition to cut the silicon to the desired point, would come out about 3.35 per cent carbon, 1.65 per cent silicon. This could be made into high-strength iron by final ladle inoculation with 0.25 per cent silicon and the addition of suitable alloys. The carbon is too high, and alloy salesmen would probably prefer to knock it down as near 3 per cent as possible to make their alloy show best results. But, if it is necessary to shift this iron into high-strength iron, it should do the trick to add to 1919 lb. of it:

16 lb. of 50 per cent ferrosilicon, for inoculation	\$0.60
24 lb. of 50 per cent ferrochromium (high carbon)	1.25
30 lb. of copper	3.50
10 lb. of nickel silicon shot	3.40
Total	\$8.75

to give an iron of 3.3 per cent carbon, 1.9 silicon, 0.6 chromium, 1.5 copper and 0.5 per cent nickel. Or, to 1967 lb. add,

16 lb. of 50 per cent ferrosilicon	\$0.60
17 lb. of 60 per cent ferromolybdenum ..	8.65
Total	\$9.25

to give 3.3 per cent carbon, 1.9 silicon and 0.5 molybdenum, either of which should give 40,000 lb. per sq. in. tensile iron.

Case B, Cold Electric

Making 3 per cent carbon, 1.50 + 0.25 inoculating silicon high-

TABLE IV
Scrap Prices Per Gross Ton Delivered to Consumers

	C. I. Borings	Cast Machine Scrap	Spread per Gross Ton
Detroit ¹	\$9.50	\$18.00 ²	\$8.50
St. Louis ¹	7.00	19.00	12.00
New York ¹	8.00	16.50	6.50
Chicago	10.50	17.00 ³	6.50
Buffalo	11.50	20.00	8.50

¹ Brokers' buying prices—Others, prices to consumers.

² Quoted at \$16.50 net ton.

³ Quoted as \$15.50 net ton.

strength iron by cold electric melting without alloying allows the use of large proportions of chips and turnings. But, since these can be briquetted for cupola use, all that the electric can be credited with on raw materials is the cost of briquetting.

Credits:

Avoidance of briquetting on about 75 per cent of the charge	\$1.50
Avoidance of cupola melting	2.65
Total	\$4.15

Debits:

550 kwhr. at 1.1c.	\$6.05
Equal charge for labor, electrodes, refractories, amortization, etc.	6.05
Iron-silicon for inoculation	0.35
Total	\$12.45
Less credits	4.15
Total	\$8.30

Case C, Electric Duplexing

With an electric furnace, a cupola melt of nearly all steel (preferably briquetted turnings) could be duplexed, plus silvery pig for silicon, coming out at 3.30 per cent carbon, 1.50 silicon, by dilution of 1800 lb. with 200 lb. loose steel turnings, with the use of about 75 kwhr. and an inoculating addition of 0.25 per cent silicon plus a little manganese to correct for low manganese in the steel. And, 250 lb. of silvery pig in the cupola charge at an assumed $\frac{3}{4}$ c. per lb. over cost of regular iron.

Excess for silvery pig	\$1.85
10 lb. ferromanganese .....	.40
10 lb. ferrosilicon for inoculation .....	.35
75 kwhr. at 1.3c. (relatively intermittent operation)	1.00
Plus an equal amount for labor in electric stage, electrodes, refractories, amortization, etc.	1.00
Total	\$4.60
Less credit for avoidance of cupola melting of 200 lb. (25c.) }	.45
Less credit for avoidance briquetting of 200 lb. (20c.) }	
Total	\$4.15

Case D, Fer X Dilution

If no electric furnace is available, this dilution can be made by 200 lb. of iron from Fer X which will be assumed to cost $1\frac{1}{2}$ c. per lb. of molten iron produced over the value of steel turnings, or \$3.

Excess for silvery pig	\$1.85
10 lb. ferromanganese .....	.40
10 lb. ferrosilicon .....	.35
Excess over value of iron, 200 lb. Fer X	3.00
Total	\$5.60
Less credits for avoidance of cupola melting and briquetting 200 lb. ....	.45
Total	\$5.15

Turn now to the cases of adjustment of carbon and silicon.

Case E

If a 3.30 per cent carbon, 0.20 silicon melt is made from an all-steel charge in the cupola, and about 1900 lb. of this is adjusted to 3 per cent carbon, no silicon, by oxidation, and the 1.75 per cent silicon added at the end, the costs of the transformation to high-strength iron figure:

40 lb. preheated ore or mill scale	\$0.15
Use of heated basic forehearth, labor, amortization, etc.	1.00
15 lb. ferromanganese .....	.60
62 lb. ferrosilicon	2.25
Total	\$4.00
Less for avoidance of cupola melting of 90 lb. ....	.10
Total	\$3.90

Case F

If, instead of producing a special cupola melt to adjust silicon (as in cases C, D and E) a use is made every day of soft iron of 3.40 carbon, 2.20 silicon, and adjustment of composition accomplished wholly outside the cupola, to 1750 lb. of this melt, may be added, in a heated basic forehearth, 25 lb. preheated ore, making the composition 3.40 carbon, 1.70 silicon. To this is added 230 lb. of iron from Fer X, and it is finished with 10 lb. of ferrosilicon.

The costs figure out:

25 lb. preheated ore	\$0.10
Use of heated basic forehearth	1.00
230 lb. iron from Fer X at $1\frac{1}{2}$ c. over value of iron	3.45
10 lb. ferrosilicon .....	.35
Total	\$4.90
Less credit avoidance of cupola melt on 250 lb. ....	.30
Total	\$4.60

Summarizing, the estimated cost of 40,000 lb. per sq. in. iron over that of an ordinary every day cupola melt has figured out as follows:

Case A—Alloying soft iron	\$8.75 to \$9.25
Case B—Cold electric	8.30
Case C—Electric dilution of high steel cupola metal	4.15
Case D—Fer X dilution, high steel cupola melt	5.15
Case E—Removal of carbon from high steel cupola melt	3.90
Case F—Removal of silicon from soft iron dilution Fer X	4.60

The high steel charge to the cupola, whether steel scrap or briquetted turnings, will ordinarily cost a bit more than cast scrap or briquetted borings, and a little more coke will be required, which factors have not been considered in the above comparison. The cost of Fer X may have been taken a little high. The estimate of \$1 per ton for the heated forehearth is probably generous too. Thus, the last four methods are likely to be even in cost so that it would be hard to distinguish among them on the economic basis.

The last three methods indicate that the production of 40,000 lb. per sq. in. tensile iron should be capable of accomplishment in a cupola foundry without requiring very expensive equipment and without materially altering ordinary cupola practice, for $\frac{1}{4}$ c. per lb. of metal in the ladle over the cost of soft iron. The 40,000 lb. iron will be a proper base for efficient alloying to still higher strength irons.

The last three methods look interesting for foundries in the transition period while the demand for 40,000 lb. iron is yet not sufficient to allow its

(CONTINUED ON PAGE 46)

SNOW CRUISER WELDED

WHEN the 37-ton Byrd snow cruiser plunged into a creek near Lima, Ohio, on its recent trip from Chicago to Boston, the strength of its welded steel construction was given a severe test. Damage was slight, however, and the huge machine proceeded on its own power after being extricated.

Weight saving enabled by welding and the use of high tensile steel gives the machine a cruising range of around 5000 miles, while some of its principles of construction suggest possibilities for designers of buses and kindred equipment. At 50 deg. below zero the high tensile low alloy steel used will withstand impact stresses 15

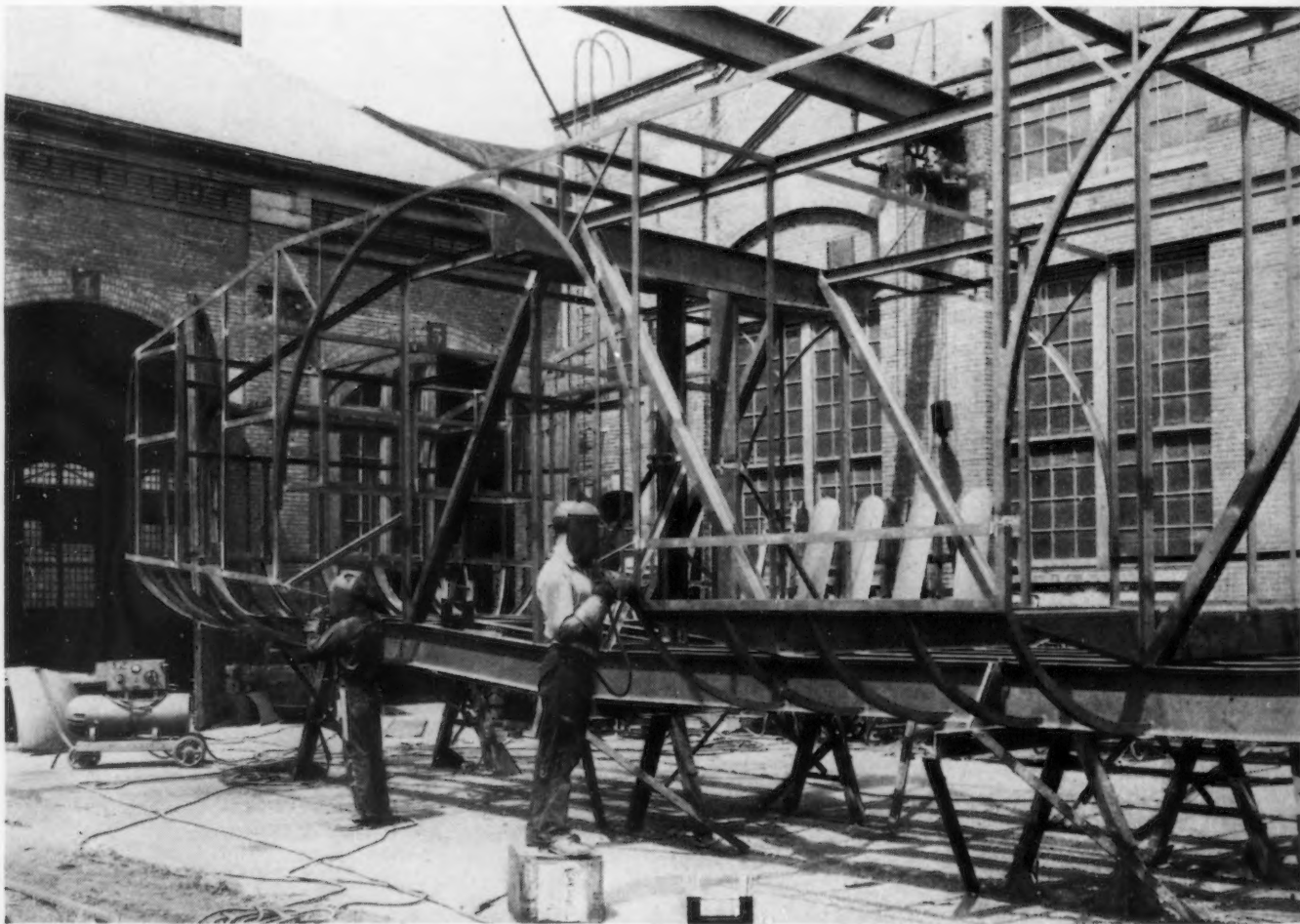
times greater than ordinary steel. It has about 80 per cent more fatigue strength, its tensile strength is 30 per cent higher, yield strength is about double and resistance to corrosion is stated as being $2\frac{1}{2}$ times that of ordinary steel. Furthermore, it is easily fabricated and welded, and normalizing to relieve welding stresses does not alter the physical properties. Throughout all of the framing there was no other means of fastening used than arc welding. Lincoln Electric Co. equipment was employed by the company doing the fabricating.

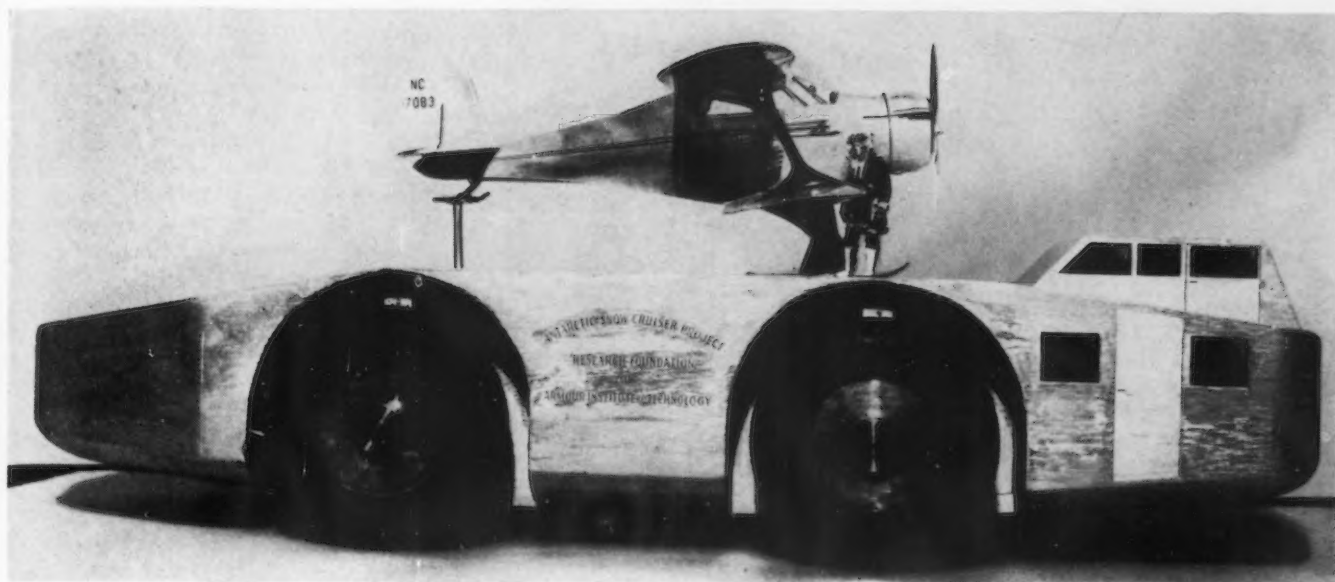
The underframe I beams were formed to simulate sled runners.

Tacking of the beams at the bending stage was facilitated by an arc welder, and the I beams were welded onto steel horses until the cruiser was completed. This construction is shown in the accompanying photo.

Such parts as pressure blocks, steering post, brackets, angle blocks, steering post bottom plates, tail gate, doors, steering pistons, motor generator bases and steering cylinders were fabricated as units. In general jigs were not economical to use, as there were too few assemblies to warrant them.

After the underframe was tack welded the vertical members at weld points were located and tacked. Pressure block posts were the first to go





up. The cross headers over these were located and tacked in place, and the diagonal H beams followed; then the H beams between the wheel headers. Bottom side ribs came next with horizontal members. All these were located and tack welded.

Wheels Arc Welded

From this point on other minor framing members were located and tack welded. When any portion of the framing progressed to a point that it was possible to check as a unit, the arc welding was started.

While the framing went forward arched sheets were being fitted and tack welded between the I beams in the underframe. About one-third of the total welding footage of the cruiser is in the underframe and the arched sheets.

All heavy sections were V'd out for arc welding and welds were continuous around all members.

The wheels of the cruiser, each weighing 810 lb. complete, and 10-ft. in diameter with tire installed, are of arc welded construction also. Weight was cut to the minimum to increase the live load, yet strength and rigidity were retained.

Disks were formed outwardly at the outside diameter to make the tire retainer and skeleton of the wheel. Two conical bands of $\frac{1}{4} \times 2\frac{1}{2}$ 66 in. diameter were formed and welded to the skeleton disk to make the bead casing support for the tire. To connect the two disks together and complete the felloe band, a flat steel plate 17 ft. 6 in.

long, 25 in. wide, of 12-gage Inland Hi steel was used. This was rough hot formed in sections, using a male and female die. Assembled, the band had an inner diameter of $57\frac{3}{4}$ in. It was formed in sections, assembled and trued up.

The workability of the high tensile steel was demonstrated by the working operation on the felloe sections. In order to test the dies, strips of a common grade of steel were first formed. This steel failed. Every piece of high-tensile steel passed through these dies was perfect with a $20\frac{1}{4}$ -in. lateral sweep and a rim radius of 33 in. Before being formed each piece was approximately $70\frac{3}{4}$ in. long. After shaping, take-up was found to be about $23\frac{1}{4}$ in. as measured along the inside arc, and stretch on the outside arc was $3\frac{1}{4}$ in.

Welding Stresses Relieved

The various parts of each wheel were ground preparatory to assembly. A bead casing support was then welded to the inside of each disk. The assembly operation was started by placing one disk on stools mounted on a heavy face plate, the disk being leveled by means of shims. The 12-gage felloe band was then placed in position and the other disk was lowered on top. Spacer blocks were used between the two disks to assure parallelism and correct spread. This assembly was tack welded and then chuck blocks fitted with adjusting set screws were used to assure accurate diameter. The wheel was then firmly

secured to the face plate by four heavy clamps. All welding possible was completed with the assembly held rigid.

After removal from the jig, eighteen 12-gage cross ribs were welded to the disks and the felloe band. Dimensions were the same after this operation except for a $\frac{1}{4}$ -in. uniform shrinkage of the tread of the wheel. All forming and welding stresses were relieved by normalizing.

Machine 55 Ft. Long

The body assembly was tacked together and chuck blocks with adjusting set screws were used to bring accurate diameter, after which the complete assembly was clamped to the face plate and welding of the unit proceeded. On removal from the jig, cross members were fitted between the disks and the felloe band. These were welded completely with the wheel in normal position.

The snow cruiser, illustrated herein, was designed and constructed by and for the Research Foundation of Armour Institute of Technology under the supervision of Dr. Thomas C. Poulter. The machine is 55 ft. long and resembles a transcontinental bus. Its speed range is between 10 to 30 miles per hr. In addition to scientists and much equipment, the cruiser is designed to carry an airplane on its back.

Some 10 ft. of the tail of the machine will be cut off in order to facilitate loading on a vessel at Boston. Reassembly by arc welding will be carried out at Little America.

INDUCTION HARDENING OF DRILL CHUCK BODIES

INDUCTION surface hardening applied to drill chuck bodies has yielded highly satisfactory results in recent months for the Jacobs Mfg. Co., Hartford, Conn., which is employing a Tocco Junior unit, a compact machine especially designed for small parts by the Ohio Crankshaft Co., Cleveland.

The chuck manufacturer has found it necessary to harden only the area subjected to wear. This is the nose of the chuck, including the key or wrench pilot holes. Previously the whole front end of the body of the chuck was heated throughout to harden the area subjected to wear, but because of the irregular cross section of the body, distortion of the jaw sockets was likely to occur, making it difficult to secure the accuracy required in the finished chuck.

Under the new method the jaw sockets are not heated, there is no distortion and the wearing surfaces are more uniformly heat treated to a harder, longer-lasting surface.

Substantial savings have been effected through elimination of rejections due to distortion or insufficient hardness; while actual production costs for the hardening operation have been lowered.

The heat treated area produced by the Tocco electrical hardening process tests at Rockwell 64 on the C scale, with a metallurgical structure highly resistant to wear and abrasion.

The Tocco Junior unit is little larger than a shop bench, though completely self contained. It is equipped with a specially designed built-in high

frequency current converter. Split second accuracy is insured, the same as on the larger hardening machines.

Time cycles and power input are pre-set and the hardening cycle is au-

tomatically controlled. The placing of bodies within the inductor coil is the only manual operation.

The Tocco process used in hardening Jacobs drill chucks was developed



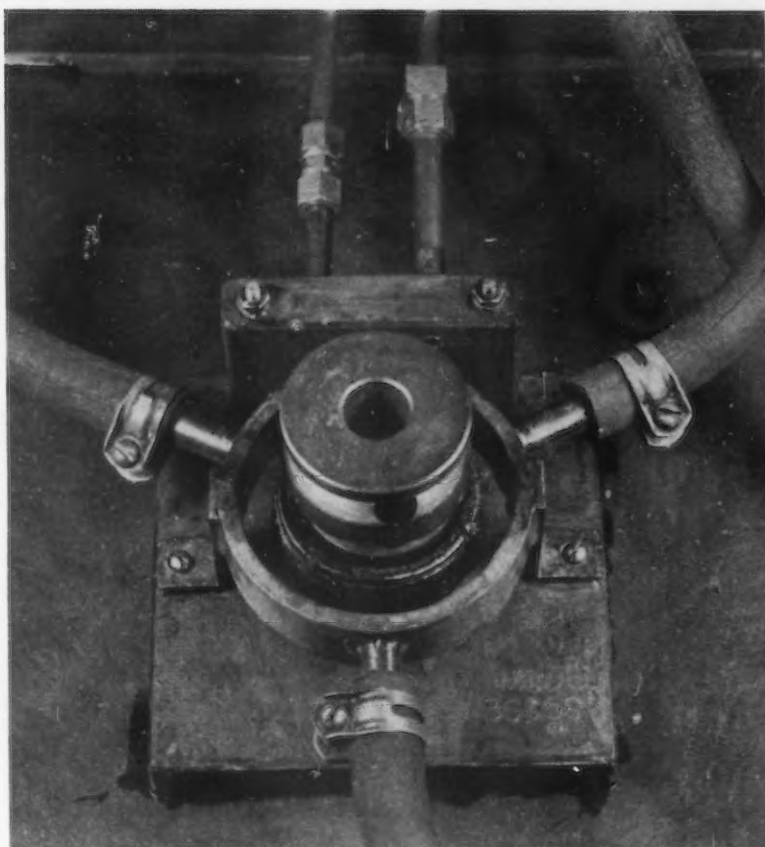
NEW Junior induction hardening machine, which is little larger than a shop bench, though completely self contained. (Ohio Crankshaft Co.—Jacobs Mfg. Co.)

originally for the reduction of wear on journals and crankshafts. It has been adapted to many other fields, including cam shafts, drive shafts, axle shafts, valve tappets, rocker arm shafts and track pins.

The localized heating for hardening is accomplished by subjecting the area to be hardened to the high frequency magnetic field produced by the passage of high frequency current through an inductor coil which surrounds but does not touch the area to be hardened. The high frequency magnetic field causes heating in the desired area by the combined heating effects of hysteresis and eddy currents. Another phenomenon accompanying the use of high frequency current is "skin effect" which confines heating to the skin or surface of the piece being heated. The source of the high frequency current in the process is a specially designed high frequency converter built into the machine and operated from the ordinary available shop power supply.

This inductive heating, so named because the heating is a result of induced current in the piece, is extremely fast, rarely requiring more than a few seconds. As soon as the area to be hardened has reached the desired temperature, the power is automatically shut off and the heated area quenched by pressure spraying through orifices in a quenching jacket, which is integral with the inductor coil, without moving the piece to be hardened.

In production, the operator places a chuck body in the inductor coil shown in the accompanying photo and pushes a button which starts the Tocco hardening cycle. At the completion of the cycle, a matter of seconds, he removes the hardened drill chuck and inserts another for heat treatment. The heating and quenching cycles are auto-



CLOSE-UP view showing chuck body in position for hardening. Only the area subjected to wear must be treated, contrary to previous practice. (Ohio Crankshaft Co.—Jacobs Mfg. Co.)

matically controlled with an accuracy of plus or minus 0.05 second. The power input, length of heating cycle, quenching pressure and time of quenching are pre-set for the part to be locally surface hardened and automatically controlled so that the operator's only function is to place the part in the inductor coil and push a button. This insures absolute accuracy of heat treatment and duplication of results.

When it is required to change the

set-up from hardening the No. 1 to the No. 36 chuck body, for example, the operator replaces the No. 1 inductor coil with the No. 36 inductor coil. Only two hose connections for the quench supply and two electrical leads to the coil need to be adjusted for this replacement. The predetermined hardening factors are then set on the control dials and the machine is ready for operation on the new part. This change is made in 5 min.

Fastening Device Nails Metal Parts Together

A NEW fastening device, called a Speed Clip, has recently been developed by the Tinnerman Speed Nut Co., Cleveland, to fasten metal parts together without the need of gaining access to the opposite side of the assembly. The device itself is a tubular-like formation of spring steel. The end of the Speed Clip that enters the hole is curled-in, while the other end seats with its flange. In this entering position, tongues on either side are compressed into the body of the clip, but with clip fully inserted, the two cam-like tongues spring out and lock the clip firmly in the hole. When the

stud is pushed completely "home," the clip is fully expanded and the curled-in end of the clip bites into the stud to lock it securely. This assembly method is adaptable to most any part such as name plates, trim strips, medallions and the like.

With slight variations in design, this Speed Clip may be used as a permanent lock, a removable lock or as a slideable grip type. In the second type, by predetermining the amount of pull desired for removal, the curled-in end of the Speed Clip is formed with the correct degree of bite. The slideable grip type is recommended where studs are made of relatively soft plastic materials such as cellulose acetates.



WHAT'S NEW IN

AMONG the machine tools introduced in recent weeks are a number of grinders of improved design, also several unconventional types such as the jig grinder, a generating style of machine for correcting errors in hole size and placement as a re-

sult of heat treatment of precision steel parts. A combination cutter and surface grinder has also been announced. New designs in boring, engraving, honing, milling, planing, sawing, turning and threading are similarly highlighted in this review.

constant speed a.c. motor driving through cone type V-pulleys or by an adjustable speed d.c. motor. In either case work revolution is push button controlled. Final drive to the face plate is by chain.

Both live spindle and dead center operations can be performed. The base is graduated and can be set at any desired angle either side of the zero or normal position. The wheel slide can be swiveled to any desired angle and fed at this angle, or it can be set at any angle and fed perpendicularly to the table ways. By releasing a single binding screw, it is possible to move the wheel unit proper backward or forward, thus increasing the distance

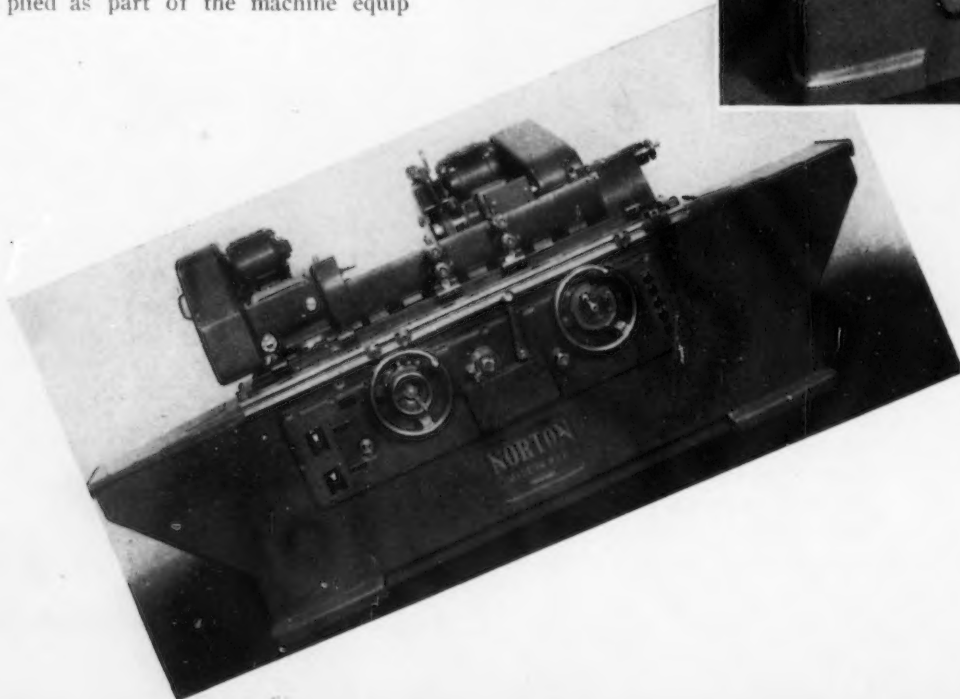
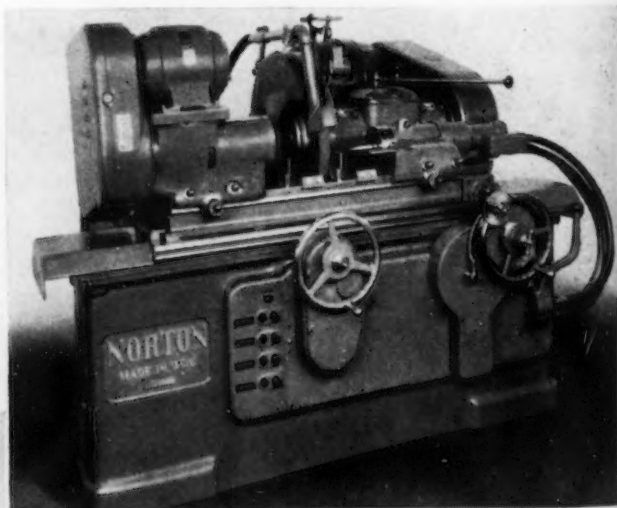
AN entirely new universal grinder known as the type LC multipurpose is announced by Norton Co. of Worcester, Mass. Being a universal machine, it performs both external and internal grinding operations. A number of interesting features have been incorporated in the design. The table can be propelled hydraulically or by hand through a two-speed arrangement, thus making it possible to move the table quickly into position or more slowly for shoulder grinding and similar operations. Two ranges of wheel feed are provided, either of which is selected by pushing in or pulling out a single knob. A stop is provided against which the handwheel can be located either for external grinding or internal grinding.

An electric dwell control for the hydraulic traverse mechanism is supplied as part of the machine equip-

ment, enabling the operator easily to adjust the amount of dwell at each table reversal within a fraction of a second.

The headstock is of the universal type and is powered by either a 1/2-hp.

FRONT view of the new Norton type C 10 x 18-in. semi-automatic grinder shown with hydraulically operated footstock. As for the type LC grinder, all motor starting equipment is housed in a cored receptacle at the rear, protected from dirt and moisture. Standard electrical equipment is used, actuated by the push buttons at the front.



AT LEFT

TELESCOPING way guards add to the neat appearance of the Norton 12-in. type LC multipurpose grinder, shown in the 36 in. length. Base is a sturdily ribbed single casting with reservoirs for coolant and hydraulic oil cast in. All push-buttons and starting switches are built in flush with the front of the machine.

MACHINE TOOLS

between wheel and work centers by as much as 6 in.—an advantage when performing face grinding operations where the headstock is swiveled 90 deg.

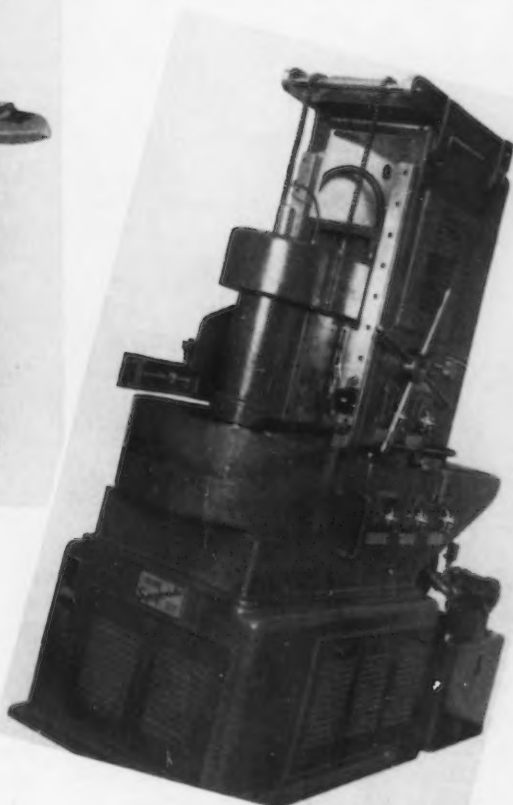
The internal spindle is bolted to the front of the wheel slide and driven by a flat belt from the same motor that drives the external spindle. Wheel drive motor can be reversed, a feature which was provided for internal and external operations. The machine swings 12 in. and is built in 24, 36, 48, and 72 in. lengths.



THE New Doall grinder may be used as a universal cutter grinder or as a precision surface grinder, simply by interchanging the heads.

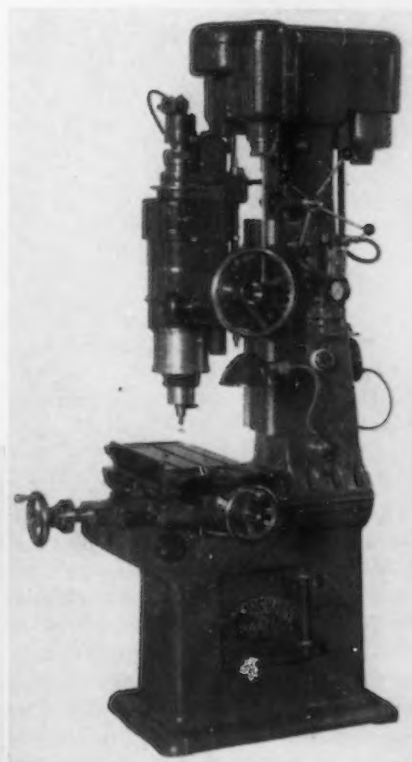
By FRANK J. OLIVER
Associate Editor, *The Iron Age*

MULTI-motion plane surface Super-finisher, made by the Foster Machine Co., Elkhart, Ind., will handle surfaces up to 12 in. diameter when the piece is held in a magnetic chuck. The machine is fully hydraulic in actuation. The upper set of controls on the column govern the oscillation and rotation of the spindle whereas the lower controls govern the oscillation and rotation of the chuck, also the speed with which the upper head traverses to and away from the center of the work, thus making the machine universal in every respect for finishing almost any commercial material. The head is advanced to the work by the turnstile lever and a limit switch starts the automatic cycle.



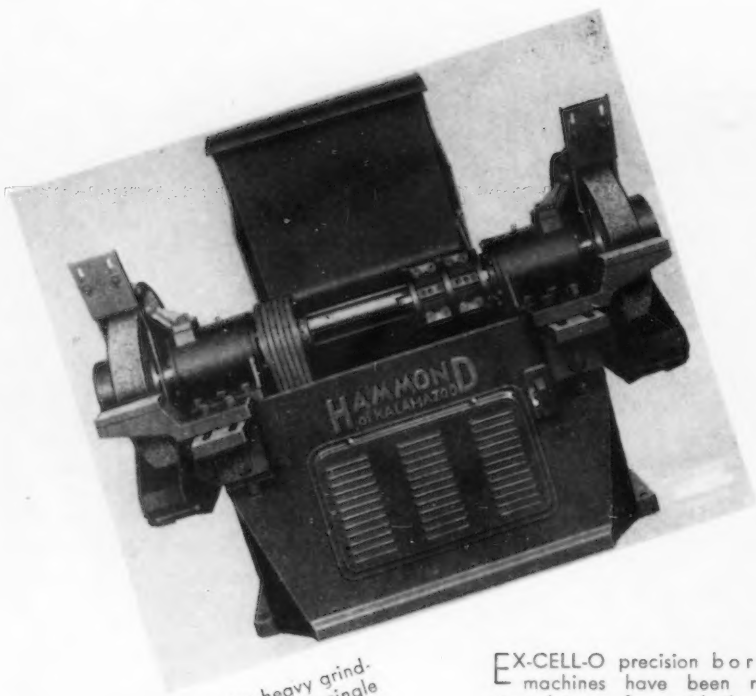
Plunge-Cut Grinder

WHILE bearing the same type designation as the earlier model there are a number of interesting and practical refinements incorporated in the new line of 10 in. cylindrical grinders announced by Norton Co. The most outstanding change has been in general appearance, a feature that necessitated a completely new base, of



ABOVE

SIMILAR in design principle to a jig borer, the Moore jig grinder is designed primarily to correct the location of holes in precision steel parts such as jigs and gages, after they have been hardened. Three grinding heads are available with spindle speeds of 15,000 to 80,000 r.p.m. to generate holes from 0.090 to 4 in. in diameter. Machine is shown with dust guards on table ways removed.



DESIGNED for extra-heavy grinding jobs, the type WR single speed grinder, recently added to the line of the Hammond Machinery Builders, Inc., Kalamazoo, Mich., has a multiple V-belt drive from motor in the base. Spindle for supporting the 20-in. wheels is 3 7/8 in. in diameter and is made in two pieces, joined by the bolted coupling shown. Machines of similar construction may be had with two, three or four speeds, for 24 or 30 in. wheels and with motors up to 20 hp.

EX-CELL-O precision boring machines have been redesigned to conform with the styling of other machine tools of the company. Hydraulic operating controls are grouped at the front. At each side of the control panel are three graduated orifice dials, the upper two controlling the rate of the first and second feeds in the direction of table travel and the lower ones controlling the dwell time of each end of the table stroke. Manual starting is by the lever and manual direction control is by the knob in the middle of the panel.



TOTALLY inclosed, polyphase motors are used in the line of portable and suspended aerial types of grinders made by the Sawyer Electrical Mfg. Co., Los Angeles. The portable models are made in 1, 1 1/2 and 2 hp. ratings and the aerial model in a 3 1/2 hp. rating. They operate on 220 volts, 60-cycle three-phase circuits, and the speed of all sizes, with the exception of a high speed geared model, is 3600 r.p.m. The geared unit rotates at 5400 r.p.m. Rotor is mounted on double shielded ball bearings. Motor efficiency is high and power pullout is said to be about twice the rated capacity.



which oil and coolant reservoirs are an integral part. The wheelslide and table ways are pressure lubricated from a separate system thus permitting the use of oils of different viscosities for lubricating and hydraulic drive purposes respectively. V-belts and a silent chain running in oil drive the headstock which has been redesigned to some extent. Likewise the footstock has been changed somewhat. Large spindles and centers assure more rigid support and contribute to the betterment of the surface finishes produced.

Type C machines are available with hand, hydraulic or mechanical traverse of the table. A semi-automatic model is also built which can be arranged for either hand or hydraulic table traverse. In addition semi-automatic machines are usually equipped with hydraulically operated footstock and headstock. Often a hydraulically operated steady-rest is also supplied. It is a plunge-cut

machine, and once parts are placed between the centers the cycle is automatic.

Combined Surface Grinder and Cutter Grinder

A COMBINATION grinder that can be converted from surface work to universal tool and cutter grinding operations has been introduced by the Doall Co., a division of Continental Machines, Inc., Minneapolis. The machine uses interchangeable heads, with some novel features. For surface grinding, a 1-hp. inbuilt motor driven spindle is provided, operating at 3450 r.p.m. Extreme accuracy is claimed through the use of a special bearing construction which eliminates end play of the spindle. The wheel is mounted so that it may be set at any angle up to 30 deg. The back edge of the wheel cover forms a reflector which carries a 9-in. fluorescent

lamp, which gives off a low temperature light, thereby eliminating the possibility of distorting the work from local high temperatures.

The detachable universal cutter grinder is a special Dumore wheel head operating at 5700 to 35,000 r.p.m. Infinite planes of full circle movement of the wheel head are said to allow a capacity for sharpening all types of modern cutters when used in conjunction with the compound table on top of the work table. The dividing head of the machine has two graduated axes and can also pass laterally across the compound table at any angle with the aid of a hand lever.

Work table rolls on ball bearings carried in a chain race, riding in ground steel wear strips which are renewable, thus adding to the accuracy and life of the machine. For surface grinding work, a permanent magnet chuck is furnished.

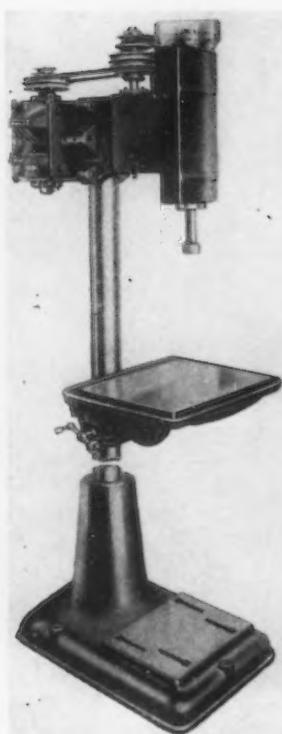
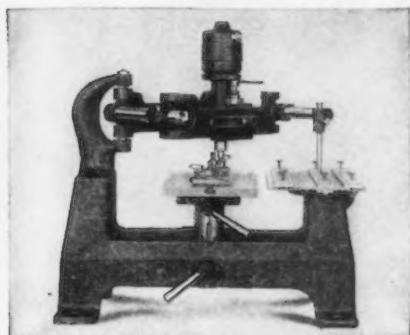
AT RIGHT

MODEL MMVT floor type honing machine with work surfaces both on the swinging table and on the floor base. This product of the Honing Equipment Corp. is for accurately finishing bores up to 2 in. diameter in either short or long pieces.

o o o

BELOW

By substituting an electric etching head for the engraving head shown, this Preis bench type, pantographic machine can be made to serve a dual purpose.



CLOSE-UP view of a Wicks model CH-8 center drive crankshaft lathe especially tooled for turning three main line bearings and facing the ends of heavy airplane and diesel crankshafts. This extra heavy machine has hydraulic feed with automatic duty cycle governed through a bank of push buttons. Both headstock and tailstock are movable on the bed. The rear tools are mounted on inverted cross slides which are carried in the massive back tool housing. Main drive is by means of a 40-hp. d.c. motor through multiple V-belts, and a 7½-hp. motor drives the hydraulic unit. The center drive gear is mounted on large roller bearings and is totally inclosed to prevent damage from chips and dirt. This special machine was made by Wicks Brothers, Saginaw, Mich.

Jig Grinder

HOLES in hardened steel can be secured within limits as to size and to location heretofore thought impossible it is stated by the makers of a new type of jig grinder, the *Moore Special Tool Co., Inc.*, Bridgeport, Conn. The base and compound table are the same as on a jig borer except that all table ways and slides are well protected from emery dust by guards which are easily removed. Spindle construction is quite different from a conventional jig borer, however. The high speed electric or air driven grinder unit is carried in a cross slide in the end of a large diameter spindle that is rotated at a much slower speed by a variable speed drive. The effect of this planetary motion is to permit holes up to 4 in. in diameter to be internally bored with a 1-in. wheel.

The main spindle consists of a sleeve mounted on two preloaded precision ball bearings, 6½ in. in diameter. Inside the sleeve is mounted a vertical slide on the end of which the cross slide is actually carried. This slide is pivoted at the bottom so as to allow a movement of 1½ deg. either way for the grinding of tapered holes, such as piercing holes with draft. Rough movement of the cross slide is done manually while the spindle is at rest, while adjustment up to 0.100 can be made in steps of 0.0001 in. by means of a

knurled dial while the spindle is in motion. In addition, the spindle has an automatic vertical feed either up or down. A positive depth stop is also incorporated. All working parts are hardened, ground and lapped to permit close fits and long life.

This jig grinder is being sold through *Marburg Brothers, Inc.*, 90 West Street, New York. Table size is 10 x 16 in. and table movement is 9 and 14 in. respectively. Vertical slide travel is 3½ in.

Precision Boring Machines

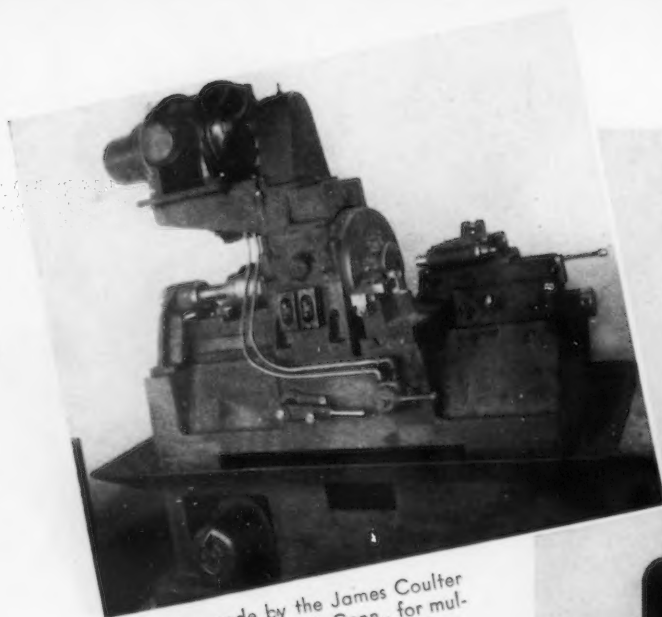
AN improved form of hydraulic control has been added to the restyled line of Junior and Senior precision boring machines built by the *Ex-Cell-O Corp.*, 1210 Oakman Boulevard, Detroit. All hydraulic operating controls are concentrated in one panel at the front of each machine. Table movement is controlled automatically after starting by adjustable table dogs, below which are five hydraulic control plungers. Two rates of feed in each direction and dwell at each end of the table stroke are all separately controlled by convenient dials. Arrangement is also made for automatic jump feeding between two feeding cuts.

Provision is made on the machine base for connecting hydraulically operated fixtures and spindle chucks to the

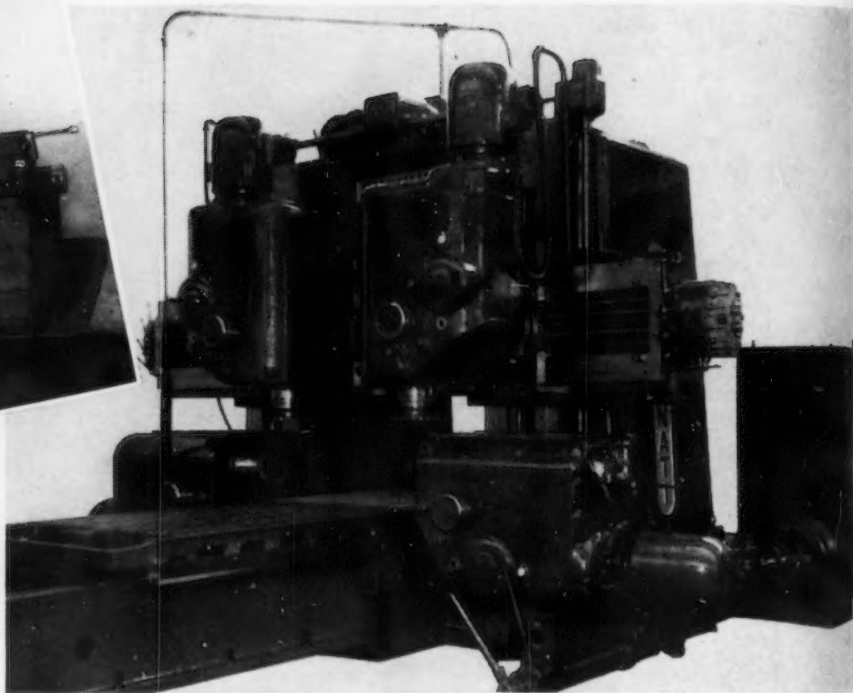
pressure and exhaust lines in such a way as to coordinate their operation automatically with the table cycle. Dogs on the rear of the table may also be used to control starting and stopping of the spindles and of coolant flow.

Bridges can be adjusted endwise on the machine base rails to reduce lost time and motion in table travel. Spindles can be mounted on the bridges at any angle to the line of table travel, for taper boring or turning. From one to four spindles can be mounted on a bridge. An Ex-Cell-O universal fixture may be used for handling a wide range of parts in small lots. For production runs the machine is equipped with a single-purpose fixture which can be hand, hydraulic or air operated.

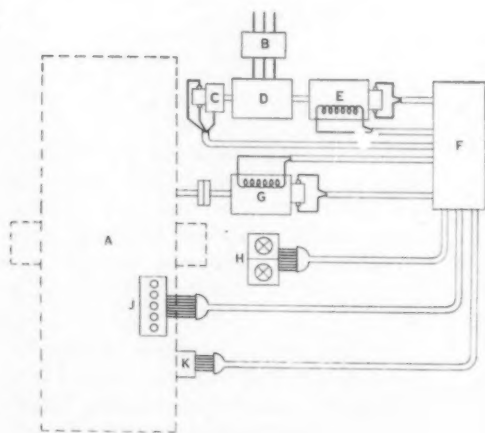
The capacity of the Junior precision boring machine is: ¾ to 6 in. diameter hole; 12 in. maximum table travel; ½ to 40 in. per min. table feed; and 15 ft. per min. rapid traverse. The capacity of the Senior machines is: ¾ to 8 in. diameter hole; 16 in. (single end) and 15 in. (double end) maximum table travel; ¼ to 18 in. per min. table feed; and 10 ft. per min. rapid traverse.



SPECIAL lathe made by the James Coulter Machine Co., Bridgeport, Conn., for multiple operations on cartridge cases. Completely automatic in operation, this machine faces and turns the case head, bores the primer hole, then reams and counterbores it from the solid end; trims the open case end to length and chamfers it inside and outside. Time of machine cycle is 45 sec., all controlled from a camshaft at the rear. All motors are equipped with brakes to prevent time loss in coasting. Loading and unloading time has been reduced to 5-in. cases, gun mark XII, shown tooled for 38 cal.



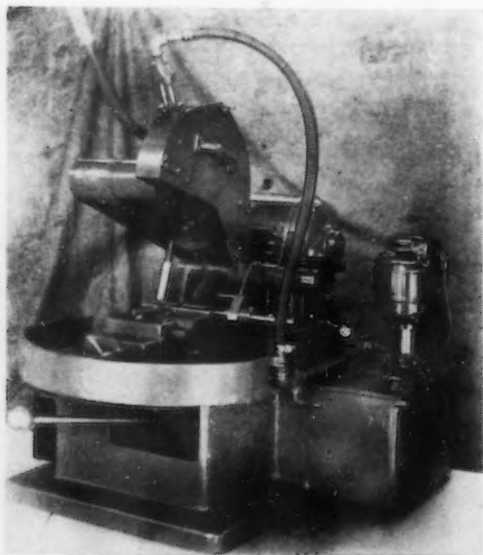
THERE are 12 cross and down feeds to each head, and eight spindle speeds, all controlled independently of the other, on this new 60 x 48 in. x 12 ft. Cincinnati Hypro planer type miller with 9 1/2 in. quills. Massive construction is used throughout.



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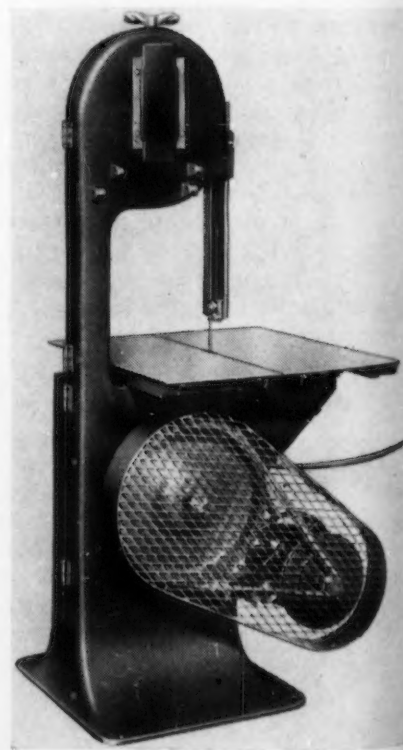
SCHMATIC diagram of General Electric variable-voltage drive for reversing planers, with units identified thus: (A) planer; (B) starter for a.c. drive motor (D); (C) exciter; (E) d.c. generator; (F) inclosed control panel; (G) d.c. planer drive motor; (H) speed control rheostat for varying field voltage of (E); (J) pendent push button, and (K) planer master switch.

FOUR cutting speeds of 60, 90, 250 and 500 ft. per min. make this No. 9 Wells metal band saw suitable for pattern work or cutting die steel, sprues and gates or sheet metal. All bearings are grease-sealed New Departure ball bearings. Frame is cast iron and the steel plate table is bolted through structural steel sections to the base. Reduction gears are helical. Band wheels are cast iron and are suitable for narrow blades for contour work as well as regular 1/2-in. blades for metal or wood. This machine is made by the Wells Mfg. Corp., 317 Seventh Avenue, Three Rivers, Mich.



AT LEFT

BIDGEPORT No. 47-W Abrasaw wet cut-off machine is a smaller size unit using 12-in. abrasive disks or smaller and is intended for the cutting of light bars and shapes. Drive is by V-belts from a 3-hp. motor which balances the disk end. Disk spindle is of stainless steel and is carried in grease-sealed ball bearings. A 1/4-hp. motor drives the coolant pump which is submerged in a tank that is part of the machine base. Vise is a quick acting type. Machine, which is made by the Bridgeport (Conn.) Safety Emery Wheel Co., cuts solids up to 1 in. and tubing and light sections up to 2 in.



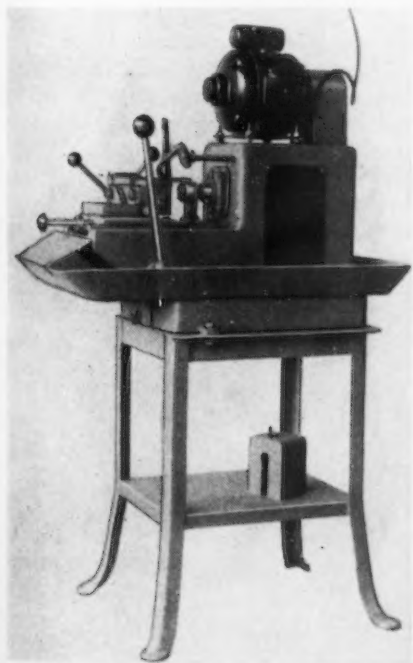
Combined Engraver and Etcher

A NEW bench-type pantographic machine for general industrial engraving work and electric etching on soft or hardened steel, has been introduced by *H. P. Preis Engraving Machine Co.*, 157 Summit Street, Newark, N. J. Separate heads, quickly interchangeable, are used for the two classes of work. On engraving work, depth of cut is controlled, independently of the depth of master characters, by a micrometer adjustment mechanism. For engraving on uneven surfaces, on slightly concave or convex surfaces, or on objects varying in thickness, an automatic depth-of-cut regulator is furnished.

On electric marking, contact of the etching point with the work is controlled by spring pressure. The etching point may be removed from its fixture and used as a hand-etching pencil for freehand marking. An electrical transformer provides three or more voltage stages for various depths of marking.

Floor Type Honing Machine

THE *Honing Equipment Corp.*, 4612 Woodward Avenue, Detroit, has added a low-priced, floor type honing machine to its line, for finishing bores up to 2 in. diameter and 5 in. long. It is a vertical type of machine for



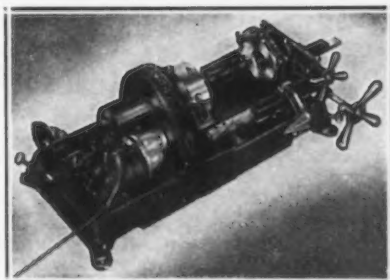
THE No. 11 size precision threading machine recently added to the line of the *Geometric Tool Co.* is a bench machine for fine pitch threads up to 5/16 in. diameter. As shown it is driven by a 1/2-hp. capacitor type motor which can be plugged into a light socket. A No. 16 size floor type machine is also new.

production honing and has an adjustable, swinging work table, also a work surface on the floor base for mounting large pieces with small bores. The head of the machine may also be furnished mounted on a bench plate, either singly or in batteries of two or more.

Drive to the head is by a four step V-belt pulley, giving four spindle speeds and corresponding rates of reciprocation at a constant ratio. Drive spindle is splined and arranged for chuck or Magic shank for lift out and quick removal of honing tool. The stroke is infinitely variable for length of bore. The machine is made of high grade materials throughout and is claimed to give highest quality of precision and finish.

Planer Type Miller

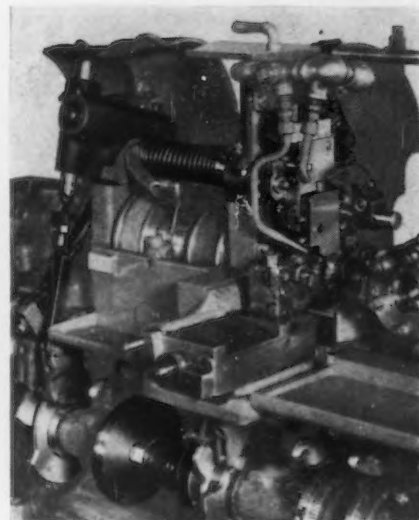
A NEW planer type miller with four 20-hp. motor driven heads and 9 1/2 in. quills is announced by the *Cincinnati Planer Co.*, Cincinnati. Hous-



AS a companion machine to the model C power unit for driving hand pipe tools, *Beaver Pipe Tools*, Warren, Ohio, has introduced the model B portable power pipe threading machine shown, with capacity up to 2 in. Powered by a 1.6-hp. universal motor, the machine also threads bolts up to 2 in. and cuts off bolt stock up to 7/8 in. Threading and reaming tools are mounted on a carriage operated by rack and pinion feed. For pipe work a ball bearing wheel and roller cut-off is available. A gear driven lubricant pump can be supplied for production work. Three styles of dieheads may be furnished.

ings are of massive pyramid construction, heavily reinforced inside and they are held to the bed with wide tongue and groove, dowels and bolts. The bed is a little more than twice the table length and is increased in depth at the center and reinforced at that point to resist the driving loads. Drive to the table is through a train of steel heringbone gears. Shafts are ground and rotate in bronze bearings. The table has 12 feeds in either direction.

All milling heads of this Cincinnati Hypo miller are completely self-contained units, provided with eight spindle speeds and 12 cross and down feeds.



LONGITUDINAL turning attachment for use on Brown & Sharpe Nos. 00 and 00G automatic screw machines. The attachment is essentially a vertical slide attachment (actuated by the left cam shown) provided with longitudinal movement for turning up to 1 in. in length, this movement being governed by a second cam, both added to the regular camshaft of the machine. Turning is accomplished independently of other operations and with the spindle running in either direction.

Each head can be fed or power traversed independently of the rest. All gears in the spindle drive are shaved and the shafts rotate in anti-friction bearings, lubricated by individual pumps in each head. All feeding and power traversing is controlled from a central pendant station.

Saddles are suspended upon the rail by anti-friction rollers bearing on a hardened inlaid steel strip. Rails on the larger of these machines are electrically clamped to the housings, and there is an interlock between the rail clamping and the rail elevating devices. A unique clamping device on the bed locks the table in position for cross milling operations without exerting side or down pressure on the table. When feeding, inner guide bearings on the table and close fitting hold-down clamps absorb all side thrusts and lifting pressures exerted on the table by the milling cutters.

This same type of machine is also built with smaller milling heads equipped with 10-hp. motors.

Variable Voltage Planer Drive

A NEW variable-voltage drive for reversing planers, recently announced by *General Electric*, is said to offer wide speed range, extremely fast acceleration and deceleration, high cutting efficiency, accuracy in stopping, and a simple system of control. In ad-

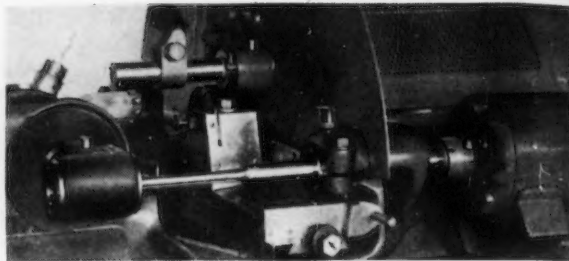
dition, the equipment gives independent selection of cut and return speeds throughout the speed range, together with a maximum number of strokes per minute on all lengths of stroke. Tests have shown that production increases ranging upwards from 25 per cent may be realized with the use of this new drive on modern planers. Table speeds from 8 to 240 ft. per min. can be obtained by using suitable gear ratios in the planer.

The drive itself consists of a direct-connected d.c. planer drive motor and an independent motor-generator set. So far as the control is concerned, a maximum of nine contactors and relays handling only small amounts of current constitute all operating devices on the control panel. The rotating apparatus has excellent commutation characteristics and, because of low armature inertia, operates with low current peaks.

Precision Threading Machine

THE Geometric Tool Co., New Haven, Conn., has rounded out its line of precision threading machines by adding two new sizes to complement the No. 14 size introduced last year. The No. 16 size is similar in design but covers threads up to 1 in. diameter in National coarse thread series and

DRILL spindle assemblies on the turret may be driven by motor in an opposite direction to machine spindle rotation with the attachment shown for use on Brown & Sharpe Nos. 00G, 0G and 2G automatic screw and turret forming machines, high speed types. The mechanism in no way limits the indexing of the turret or the movement of the tool slide since there is a keyed, sliding connection between the drive shaft and the right angle drive on the rear of the turret. Motors are 1/4 hp. for the No. 00G machine and 1/2 hp. for the other two. Drill speeds are correspondingly 4550, 4050 and 4360 r.p.m. Motor drives for cross drilling attachments are also announced for use on this same range of automatics.



sizes up to 1 1/2 in. fine pitch threads. The corresponding range on the No. 14 machine is 9/16 and 1 in.* The new No. 11 size, illustrated, is a bench type and is intended primarily for small diameter fine pitch threads up to 5/16 in. diameter and on very fine pitches up to 9/16 in. diameter. All three machines are guaranteed to produce Class III fits. This high degree of accuracy is attained through the use of adjusting screws for maintaining both vertical and horizontal alinement of the work holder on the carriage with the axis of the die spindle, and other design features.

Either the style KD Geometric rotary diehead using conventional milled

or tapped chasers or the style TR diehead employing tangent or circular chasers may be furnished optionally. Spindle and drive shafts are mounted in tapered roller bearings and drive from the motor is by V-belt. Spindle speed changes are made by pick-off gears. The machine platen is mounted on hardened and ground ways and is advanced to the threading tool by hand lever. The standard vise carries an automatic work gage or stop to insure the proper setting of the work. The machines can be supplied with bare platens, with a standard two-jaw vise or with a collet holding device. Special work holders may also be furnished at the factory.

Miniature Model of Turret Lathe Built in Complete Detail

A MINATURE Warner & Swasey turret lathe that is an exact replica in every detail of a full size machine, including turrets that actually index, a head stock with a complete range of adjustable speeds, and a miniature oil pump that circulates coolant liquid, stole the show when employees exhibited their hobbies at the Warner & Swasey open house recently. The model, which was made by Paul H. Klamm, a planer department foreman, is complete in every detail. It has way covers, a square turret lock bolt with remote control, rapid traverse, adjustable turning heads on the hexagon turret, even a tiny stop roll with adjustable stop screws—and everything works. It is not much more than 20 in. in over-all length. Mr. Klamm is pictured center above, showing the model to William J. Burger, Warner & Swasey works manager (left), and Nels Swenson, plant superintendent.



NEW MACHINES FOR COLD STRAIGHTENING

SUPERIOR straightening effect, greater roll life, elimination of end bends, less power and greater speeds of production are said to result from the application of a new principle of straightening incorporated in a line of bar and tube straighteners recently introduced by the Mackintosh-Hemphill Co., Pittsburgh. In all cold straightening work the forces involved must exceed the elastic limit of the pipe or tube material. In the Mackintosh-Abramsen machine, shown in the accompanying illustration, these forces have been controlled and limited so as to be most effective and those forces that are of no value in the straightening process are said to have been eliminated, thus reducing the power requirements.

Chief distinction of the design is that three sets of rolls are used in place of the usual single or two pair. Power is applied to the entering and leaving pair of rolls, the middle pair being idle. All rolls are crossed in a horizontal plane, and the bottom rolls of the entering and leaving pair are fixed in height so that no adjustments have to be made in the corresponding feed and catch tables. All upper rolls are adjustable for size of tube, and the middle pair of rolls is adjustable vertically as a unit as well, to control the amount of misalignment with respect to the other two pairs.

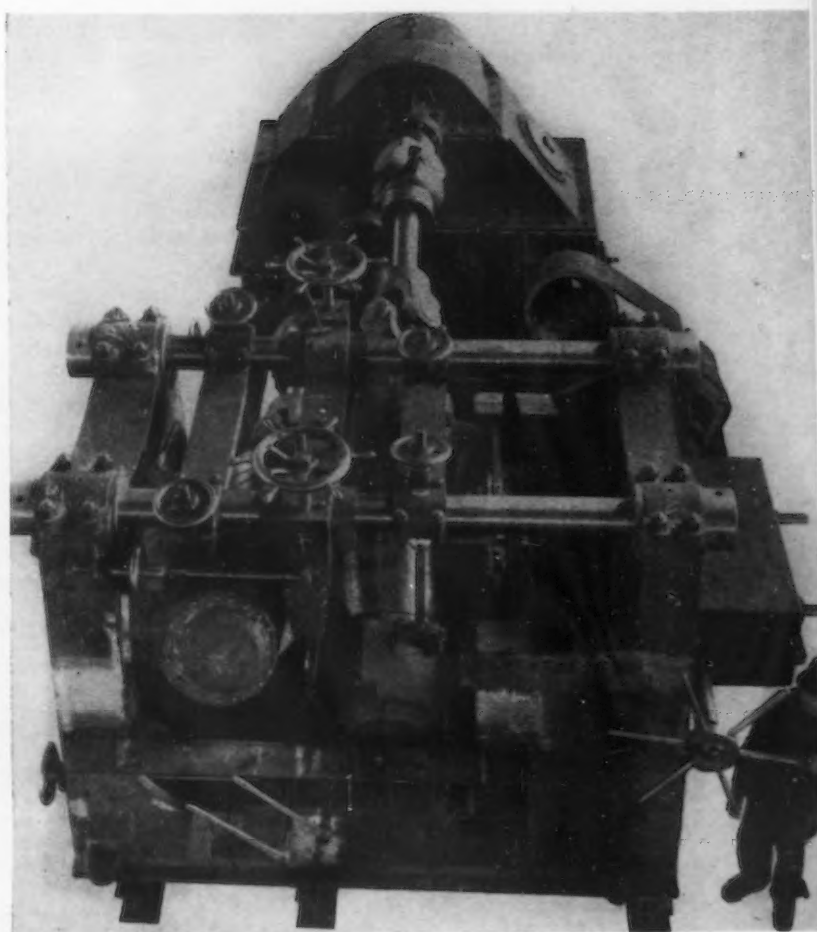
Bending takes place from the ends of the rolls in the first pass to the ends of the rolls in the middle pass and again from the middle pass to the third pass. Bending or straightening on the stock is from section to section and not from point to point. Since the bending is taken largely by the idler rolls, the wear on the work rolls is said to be reduced to a minimum. Furthermore, both top and bottom rolls are driven, tending to equalize wear. The angularity of the rolls with respect to each other in each pair also tends to distribute the wear over the entire face of the rolls. In fact, the company states

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MACKINTOSH-ABRAMSEN six-roll straightener for bars, tubes and pipe (top) operates on a new principle of design. The No. 9 Medart automatic straightening, sizing and polishing machine for bars up to 9 in. in diameter, a front end top view of which is shown (right), is believed to be the largest cold straightener in the world.
o o o

that the clamp-effect upon the stock covers about 80 per cent of the effective length of tubing in the machine. This design spreads the effective pressure over a large surface of the stock and hence removes small bends with ease.

Largest Straightener

IN one of the largest steel mills in the Pittsburgh district, the Medart Co., St. Louis, has installed what is believed to be the largest cold straightening machine in the world, as shown



in the accompanying illustration. Known as the No. 9 Medart continuous automatic straightening, sizing and polishing machine, it will accommodate alloy and carbon steel bars up to 9 in. diameter.

Alloy and carbon steel bars with maximum elastic limit of 105,000 lb. per sq. in. and ultimate strength of 180,000 lb. per sq. in. Speeds range from 180 ft. per min. for a 2-in. bar to 60 ft. per min. for 8-in. bars.

THIS WEEK ON THE

ASSEMBLY LINE

By W. F. SHERMAN

Detroit Editor

... 1939 output is 3,720,000 cars and trucks, marking tenth best year for auto industry ... Detroit employment index soars to near-record height ... Nash light car to be announced next summer ... Inquiries for steel made by industry; unbalanced inventories caused by popularity of coupe and four-door over two-door.

DETROIT—Factory employment in the automobile industry has soared to record heights, output for the fourth quarter approaches the all-time record, and prospects for the automobile industry in the months ahead are undimmed by anything that is immediately in sight.

This being the season for statistics, Ward's Automotive Reports, authority on the numerical status of the industry, has estimated that automobile production for the calendar year 1939 in the United States and Canada will total approximately 3,720,000 passenger cars and trucks. This is the tenth best year in the history of the industry and a sharp gain over the 2,655,171 produced in 1938. The all-time peak was established in 1929 when 5,621,715 cars and trucks were produced. Years in which total production exceeded the 1939 volume, in addition to 1929, were 1937, 1936, 1928, 1926, 1925, 1923, 1935 and 1924, in that order.

With just a few days left in 1939 for production of automobiles, volume for the last quarter of this year comes close to the all-time peak for the period, established in 1926 at 1,154,806 units.

The five working days in the week before Christmas resulted in a total output of 117,705 vehicles, compared with 118,405 units, the revised figure for the preceding week. This substantially widens the margin over a year ago when the corresponding week saw assembly of 92,890 vehicles. Ford and Plymouth both increased output during the pre-Christmas week, Ford stepping up from 24,500 to 25,000

Fords and Mercurys, and Plymouth increasing assemblies from 12,440 to 12,950. There was also a gain of 25 Lincoln-Zephyrs—the 800 Lincoln-Zephyrs turned out during the week appearing to be a record for that make of car. The Chrysler total was nearly unchanged, 27,135 compared with 27,250 a week ago. General Motors plants completed 49,110 units against 49,857 in the previous week, Chevrolet remaining unchanged at 28,000 units.

Output during the current week and

Car Sales in 11 Months Gain 43% Over 1938

NOVEMBER passenger car retail sales of 257,336 brought the total for the first 11 months of this year to 2,449,423, a gain of 43 per cent over the 1,715,727 units sold during the comparable portion of 1938, according to the Automobile Manufacturers Association.

The November total was 9 per cent over the 236,584 cars sold during the previous month.

Meanwhile, retail sales of commercial vehicles during the first 11 months were up 36 per cent over the year before totalling 478,625 compared with 351,203 in the like months a year ago. The November total of 45,570 was 11 per cent above October.

Retail sales of all motor vehicles combined amounted to 2,928,048 in the 11 months, an increase of 42 per cent over the total of 2,066,930 in the comparable period last year.

the week immediately after New Year's Day probably will be below the 100,000 mark, but production is expected to spurt upward after that.

Relatively peaceful labor conditions prevail and, at the same time, it is reported that factory employment in Wayne County (Detroit) is higher this year than in any previous December, with the sole exception of 1936. Approximately 387,000 wage earners are employed in the area now, about 43,000 more than were working a year ago and 21,000 more than were employed on Sept. 30, 1939, the previous high point of this year. The industrial employment index of the Detroit Board of Commerce stood on Dec. 15 at 113.6, as compared with 105.9 at the end of November and 100.9 on Dec. 15, 1938.

Nash to Build Light Car

How light is a "light" car? Another answer to this old question in the automobile industry—will roll down the highways sometime in the next summer—probably in June—when Nash is expected to offer a car somewhere in the classification between the Willys and the Studebaker Champion.

This design was mentioned last Aug. 10 in the Assembly Line. It is already in the stage where a tooling up program is imminent. As a matter of fact, a few heavy machines have already been ordered. Probably a close examination of machine tool orders in the last 60 days will reveal more that are already scheduled for delivery to the Nash plant because the company appears to have anticipated somewhat the difficulty of obtaining delivery of equipment. However, the major machine tool buying depends upon a program yet to be approved. It is understood also that when the tooling up program gets the final OK, most of the buying will be done at Kenosha, Wis., although past experience indicates that some buying might be done at the Detroit offices of Nash-Kelvinator, where the major executives of Nash are housed.

This is a Pratt & Whitney Insurance Policy

These Pratt & Whitney Cylindrical Plug Gages in the tool crib of a large manufacturer are typical of hundreds of similar installations. They are the best possible insurance against errors in hole sizes. The lasting accuracy built into them by Pratt & Whitney craftsmen is transmitted to the parts they check. It is a guarantee of accurate, trouble-free assembly later on.



Considerable success has attended efforts to sell two of the "light" cars in the last few years. The Champion has been a major factor in the comeback of Studebaker and since last spring has made that firm something to be reckoned with in totaling up automobile production or sales. Also, the Willys is steadily gaining ground—with a recent report indicating that sales since the start of production on the 1940 model are 71.6 per cent above the same period a year ago when 1939 models were introduced. This compares with a national gain in retail sales of all automobiles of approximately 46 per cent during the same period.

Sales Trend Encouraging

Regarding the general sales trend in the automobile industry today, the following has come to light: while a seasonal decrease in new car sales has been indicated in some reports for early December, this tapering off has no effect at all on sales of at least one manufacturer. Chevrolet, during the first 10 days of December, not only

smashed all records for that period in the history of the company with a single exception (1936) but has also exceeded sales in any 10-day period in November. Thus this organization is able to show a continuous growth in the number of sales since the new models were introduced in the fall. However, it is anticipated that the peak will be reached sometime during the month.

Significance of Chevrolet's December figures is explained by William E. Holler, general sales manager. "Those familiar with the industry," he said last week, "will readily appreciate the significance of these early December figures. It is almost unheard-of for the first 10 days to exceed the preceding month's final 10 days, at this season." He declared that these sales figures indicate that the condition of the market is such that continued heavy volume of sales may be expected during the months ahead.

D. U. Bathrick, Pontiac general sales manager, substantiates the view that production will continue heavy during the first quarter, saying, "Un-

filled orders on hand are more than two and one-half times greater than they were a year ago, with new car inventories still well under normal."

Demand for Steel Gains

Demand for steel in the Detroit area shows an increase, with several inquiries out currently. Ford Motor Co. is understood to be in the market for 31,000 tons of steel and both Briggs and Buick have initiated inquiries.

An out-of-balance condition in steel required for various models is reported to be currently affecting inquiries. The out-of-balance of inventories is attributable to a change in consumer demand for types of bodies.

This change in consumer sentiment ordinarily is anticipated by the automobile industry because very careful surveys are made continually on such subjects. However there has been a sudden and unexpected switch in public favor from the two-door sedan to the four-door and the coupe. Probably the reasons lie in the fact that (1) the differential in price between the two-door and four-door has shown a tendency to grow smaller and (2) the introduction of the five- and six-passenger coupe has provided a close-coupled passenger car of great popularity. Among the explanations given in the past by customers who favored two-door sedans were the price factor, the assertion that the back seat is seldom used, and the safety factor of eliminating rear doors, particularly when children ride in the rear seat.

The change in sentiment was quite rapid after introduction of new models this fall. As a result, many automobile companies found that inventories of steel for two-door types were not decreasing very rapidly, while all of the material for four-doors and coupes were "eaten up."

Fruehauf Trailer Co., Detroit, has completed arrangements with Edward G. Budd Co., Philadelphia, whereby it will distribute a line of stainless steel commercial trailers formerly handled exclusively by the Budd company. The Budd-shot-welding process which has been used in the development of stainless steel streamlined railway coaches is to be used in making the trailer bodies.

F. W. Marshall & Co., Pennsylvania Building, Philadelphia, will take over the ore business of the late William W. Hearne. F. W. Marshall has been associated with Mr. Hearne for the past 10 years.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



A.S.T.E. Annual Meeting In New York March 7-9

TENTATIVE plans have been announced for the 1940 annual meeting of the American Society of Tool Engineers, which is to be held at the Hotel New Yorker, New York, March 7, 8 and 9. There will be no exhibits this year. Ray H. Morris, of Hartford, Conn., is chairman of the meeting committee.

On Thursday afternoon, the meeting will be opened with a technical session devoted to the subject of the economics of tooling, covering the problems of tooling large and small parts in large and small quantities. In the evening, there will be two simultaneous sessions, one concerning the production of precision small gears, the other tooling for plastics. Simultaneous sessions on Friday morning will cover the subjects of screw machine tooling and punch and die design.

At the Friday afternoon session several viewpoints are to be presented on tool engineering education, including industry's needs, the educational facilities available and what is being done to coordinate these activities. At the annual dinner Friday night, an industrial executive of national prominence is scheduled to speak. The meeting will close with a technical session on Saturday morning devoted to a symposium on cutting tools and materials, presented by four speakers.

New Cast Metal Handbook

THE second edition of "Cast Metals Handbook," reference book for foundrymen and casting users, has been published by the American Foundrymen's Association. The new edition is constructed along lines similar to the first issue but the information has been revised and brought up-to-date and, in many cases, has been considerably expanded. The handbook was prepared with the twofold purpose of providing designers and casting users with ready access to accurate and complete information pertaining to the properties and characteristics of cast metals and at the same time to provide foundrymen with condensed data on the most modern, approved foundry practices and the new alloys and other refining of metal castings which has taken place in the four years since the first edition was published. Copies of the new handbook are obtainable from the association's offices at 222 West Adams Street. Cost is \$3 to A.F.A. members and \$5 to others.

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THIS WEEK IN WASHINGTON

... Testimony before Smith committee investigating NLRB shows Secretary Witt conferred with SWOC leaders before complaint against Inland Steel Co. was filed ... Big shake-up in board expected as result of disclosures of CIO bias and other acts of maladministration.

By L. W. MOFFETT
The Iron Age

WASHINGTON — Members of the National Labor Relations Board were enjoying a breathing spell this week from the Cyclopean eye of the special House committee investigating its activities but to most observers it was the calm before the storm. In addition to facing the prospect of a severe Congressional rebuke and perhaps a White House reprimand that may oust them from the New Deal circle there were indications that board members will be faced with the more immediate possibility of having a number of NLRB cases reopened on the basis of information developed by the committee.

While that possibility was understood to apply to all cases referred to in the testimony where instances of irregularity on the part of NLRB officials were uncovered, there were signs that the testimony received early last week may have a definite bearing on the Inland Steel case now pending in the U. S. Circuit Court of Appeals in Chicago. That court has before it the company's petition to set aside the order, the specific complaint being that the company received an unfair trial at the hands of NLRB Trial Examiner Charles A. Wood.

The company already has claimed that it failed to obtain "due process of law," a contention which was substantiated to a considerable degree by testimony given the committee last week. Specifically, the information developed by the committee showed that officials of the labor board actually guided the strategy employed by the Steel Workers Organizing Committee before the case was brought before the board. Nathan Witt, NLRB secretary whose dismissal has been unsuccessfully sought by Board Member William Leiserson, proposed a plan to CIO officials in the so-called "little

steel" strike in 1937 for expediting a board decision, the testimony revealed.

Conferred With SWOC

Evidence was introduced at the hearing showing that Mr. Witt, acting on the board's orders even before the SWOC filed charges against the company, flew to Pittsburgh on June 1, 1937, to confer with Philip Murray, SWOC chairman, and Lee Pressman, CIO counsel, and discussed with them a plan to bring the company to terms. Mr. Witt conceded that a formal complaint had not been brought by the SWOC at that time but pointed out that charges ultimately were filed against the company.

Although Representative Arthur D. Healey, Democrat of Massachusetts and co-author of the Walsh-Healey Public Contracts Act, expressed the opinion that nothing in the Wagner Act precludes such a "consultation" in advance, Mr. Witt admitted to Representative Abe Murdock, Democrat of Utah, that he knew of no other Government administrative agency which confers with prospective litigants for the purpose of working out a plan of strategy.

It was suggested by Committee Counsel Edmund M. Toland that the Inland incident constituted a "conspiracy" between the board and the SWOC but after committee members wrangled among themselves over the propriety of the charge, it was ordered stricken from the record. However, two members of the committee charged that the board's action constituted an attempt to "entrap" the Inland Steel Co. into a position in which the SWOC could bring charges against it.

Mr. Witt emphatically denied the allegation of entrapment, adding that the Inland Steel Co., Republic Steel Corp., and the Youngstown Sheet &

Tube Co. all were involved in strikes at the time and that he considered it better for the dispute to "proceed under the Labor Act rather than on the picket line."

The testimony at time bordered on the spectacular with listeners glued to their seats to catch the details of one development after another. Many circumstances which employers have suspected and have complained of ever since the inception of the Wagner Act, but have been unable to do anything about, were uncovered in two short weeks of testimony. Yet the hearings have only begun.

Testimony surrounding the NLRB case against the Cincinnati Milling Machine Co. developed the evidence that a CIO union was unwilling to settle a labor case because of obligations to Communists. A telegram sent to the board by Philip G. Phillips, Cincinnati regional director of the NLRB, revealed that the company was willing to have a consent decree entered withdrawing recognition from an employee representation union but insisted that the board in exchange drop a requirement that one Mike Mischeff, a member of the Communist party, be rehired.

Mr. Phillips' telegram related that the CIO union was unwilling to proceed along these lines, claiming "obligation to Communists." In reply Mr. Phillips received a wire from Board Secretary Witt reading:

"Board believes you should forward on the evidence and not agree to settle as long as union wishes to proceed."

Charges Board Is Biased

In its conduct of the labor board investigation thus far, the House committee headed by Representative Howard W. Smith, anti-New Deal Democrat of Virginia, has sought to hammer away on charges that (1) the board has been strongly biased in favor of the CIO; (2) that there has been in some instances a pre-judgment on cases even before formal complaint was filed with the board and (3) that the board has attempted to exercise the functions of administrator, prosecutor, judge and jury. It is expected that when the committee reconvenes on Jan. 5 the next step will be to go into the subject of "forced settlements" under which companies allegedly have been influenced either through

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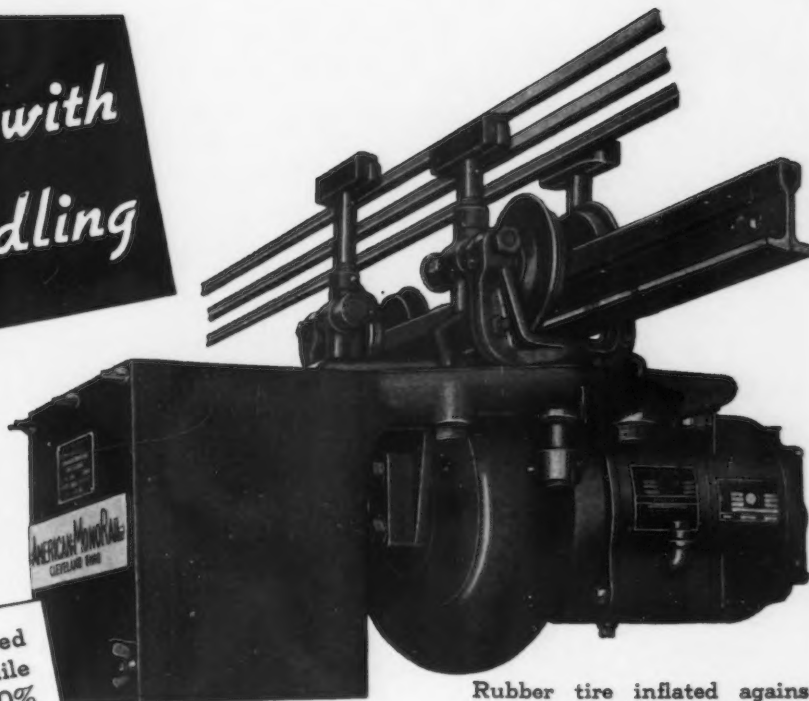
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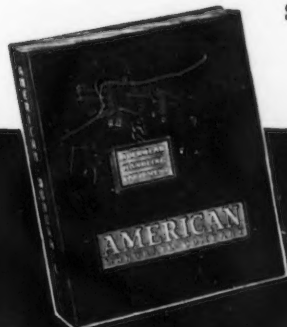
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board pressure or otherwise to settle cases without litigation because of the expense involved; and of reviewing cases where employers have been caught in between the crossfire of the two warring labor factions.

Present plans call for the committee to continue its hearings in Washington for a two-week period. On or about Jan. 22, it will move on to Detroit, which has been described by Chairman Smith as "a hotbed of labor troubles." It will next hold hearings in other key industrial centers before moving on to the Pacific Coast. Out of the original \$50,000 appropriated by Congress for the investigation, the committee has a \$20,000 balance, but this is considered sufficient to finance the contemplated hearings outside of Washington.

There are reports that a majority of the committee has reached a tentative decision to ask Congress to make changes in the Wagner Act but to what extent the committee will go in view of an apparently unanimous view among the members that the principles of the Wagner Act should be retained. However, it is known that all five members have had some informal discussions on the matter and have been considering parliamentary procedure under which the House could debate the subject.

Wants to "Junk" the Board

One member of the committee who has a pro-color labor record in Congress is understood to have privately expressed the view after listening to several days of the testimony that it might be just as well to junk the present board and comply with the proposals advanced by the AFL calling for a five-man board and for certain procedural changes in the Wagner Act.

William Green, AFL president, conferred with Committee Counsel Toland last week at the conclusion of the first phase of the hearings and announced that developments at the inquiry tend to support the AFL charge that the board has been partial to the CIO and that it has given protection to Communists. Mr. Green conferred with Mr. Toland on AFL witnesses to be called before the committee.

At the same time the National Association of Manufacturers, timing its announcement to coincide with the revelations made by the Smith committee, characterized the Wagner Act and its administration by the NLRB as "a menace to the national welfare." It recommended sweeping changes in the act and declared that the law was based on false assumptions which "have been frequently magnified and accentuated by one-sided and biased administration."



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NLRB Secretary Witt Tells of Conferring With SWOC Officials in Alleged Plan to "Trap" Inland

WASHINGTON—How the National Labor Relations Board guided the strategy employed by the Steel Workers Organizing Committee in its attempt to gain recognition from the Inland Steel Co., in the "little steel" strike in June, 1937—a story which has prompted a charge of "entrapment" against the board—is told in the following excerpts taken from the official stenographic transcript of proceedings on Dec. 19, before the special House committee investigating the NLRB:

Edmund M. Toland, committee counsel, questioning Nathan Witt, NLRB secretary whom Board Member William Leiserson attempted to remove from office:

"Before reaching the (Inland) case, I would like, Mr. Witt, for you to tell the committee when it is possible, and in what manner, is the jurisdiction of this board invoked in complaint cases."

Mr. Witt: "The jurisdiction of this board is invoked in complaint cases when a charge is filed with the board, either in the regional office or directly with the board in Washington. However, I think it may be relevant to state at this point that in connection with the prospective filing of charges, the regional officers, as well as officials of the board in Washington, often confer with parties: They may be unions, they may be employers. They may be counsel for unions, they may be counsel for employers."

Board's Authority Questioned

Mr. Toland: "Now directing your attention to the statute, I ask you, is it a fact that under sections 9 and 10 the board has no authority of its own either to solicit or to start or cause or join in an investigation of a "C" (complaint case) charge?"

Mr. Witt: "I think that is a correct statement."

Mr. Toland: "Now directing your attention to the month of June, 1937, I ask you to tell this committee what conference, if any, you had in the City of Pittsburgh with Philip Murray

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(SWOC chairman) and Lee Pressman (CIO general counsel)?"

Mr. Witt admitted he attended such a conference but did not describe its character at this point.

Mr. Toland: "Did any member of the board direct or suggest to you your attendance in the City of Pittsburgh at that conference?"

Mr. Witt: "The full board did, Mr. Toland."

Read into the record at this point

was a report Mr. Witt made to the labor board on his conference with SWOC officials in Pittsburgh.

Conferred With Murray and Pressman

"I conferred in Pittsburgh yesterday with Philip Murray, chairman of SWOC, and Lee Pressman, its general counsel," the report said. "We explored the situation as it concerns Republic, Youngstown, and Inland Steel, the three companies which are presently being struck by SWOC. The

principal thing in which SWOC is interested is a quick decision from the board as to whether or not a written agreement is required if the parties come to an understanding after negotiations.

"Since the presentation of the question to the board is tied up with the question of majority, I explored the latter question first with Murray and Pressman. It then developed that in the case of Inland, SWOC claims to represent a very large majority of the workers, roughly about 85 per cent. It also developed that SWOC is prepared to disclose its membership lists in the case on Inland. This being so, I suggested that the quickest way of getting a decision is for SWOC to modify its approach on the majority question and, instead of asking bargaining for its own members only, ask for exclusive bargaining on the basis of its claim to majority representation. At the same time, it could ask for negotiations looking toward a written agreement.

"All other things equal, Inland would probably refuse the request on the ground that collective bargaining does not require a written agreement even if the parties come to an understanding on the provisions—as they apparently have in this case on the basis of the Carnegie-Illinois agreement. If at the same time as it makes the demand, SWOC also offers to prove to Inland before the conference that it represents a majority, then Inland's refusal to negotiate on such a basis would lead to a claim by SWOC that Section 8 (5) had been violated.

"After checking on this with Mr. Edwin Smith (NLRB member), I left the problem with Murray and Pressman. They have been in touch with Brittner, the SWOC director in Chicago, and he is checking his books to see whether they are in shape for presentation to the company. If they are, SWOC will make a demand on Inland, in the above terms and, upon refusal, will file a charge. . . .

"In the meantime, it would be very helpful if the economic staff began immediately gathering material on the question of written agreements so that we could have such material ready for the hearing and for the decision."

Referring to this report, Mr. Toland continued:

Was Action "Fair and Impartial"?

"Now, Mr. Witt, I ask you to tell this committee the circumstances concerning your going to Pittsburgh, and also ask you to tell this committee whether or not you were acting with-



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in the scope of your authority as an employee of the board, and whether your acts were the acts of a fair and impartial official of the Government of the United States."

Mr. Witt (after being interrupted for a further identification of Mr. Murray for the benefit of committee members): "As I was starting to say, on June 1 one of us in Washington received a call from either Mr. Murray or Mr. Pressman. . . . As I remember this call to the board, Mr. Pressman and Mr. Murray wanted somebody to come to Pittsburgh to talk as a board representative in connection with charges which they thought they might file against one or more of the companies involved in the strike. In any event, the matter came before the full board and it was decided to send me to Pittsburgh. . . ."

"When I returned to Washington I prepared this memorandum. I don't recall any further conference with the board. I don't recall what happened when SWOC filed its charge in the Inland case in Chicago. I do recall of course that the charge was filed."

Courts Have Not Ruled

Referring to his previous statement that the board has no jurisdiction until a charge has been filed, Mr. Witt was asked by Representative Abe Murdock, Democrat, of Utah, if any court had ever ruled on that question.

Mr. Witt: "No, as a matter of fact, Congressman Murdock, we have never had a specific ruling on that point. I am glad you asked that question because there has been doubt in the minds of some of us as to whether or not the charge which section 10 seems to require to be filed, is jurisdictionally necessary."

Representative Harry N. Routzohn, Republican of Ohio: "Can you quote anything from the act that gives you authority prior to the filing of a charge?"

Mr. Witt: "That very provision, section 10 (d) says 'whenever it is charged.'"

Mr. Routzohn: "But there is no charge in this (Inland) case. You are talking about having a charge filed, which indicates something in the future. There wasn't any charge in this case, was there?"

Mr. Witt: "That is true."

Mr. Routzohn: "At the time you went to Pittsburgh?"

Mr. Witt: "That is true."

No Charges Have Been Filed

After reading Section 10 (d), which provides that "whenever it is charged

that any person has engaged in or is engaging in unfair labor practices." Mr. Witt agreed again that no charge had been filed in the case but pointed out that "I don't think this question can be fully understood unless you stop a moment to consider our procedure. Now take the procedure—"

Mr. Routzohn (interposing): "I am talking about your authorized procedure, not what your procedure was."

"So am I," the witness said, explaining that "any person who has a

legitimate interest in a labor dispute," even to the extent of requesting a flying trip to Pittsburgh, can call upon the board.

Mr. Toland: "You had an office in Pittsburgh, didn't you, at that time?"

Mr. Witt: "We did."

Mr. Toland: "You have an office there now, don't you?"

Mr. Witt: "We do."

Mr. Toland: "Will you take the ex-
(CONTINUED ON PAGE 48)

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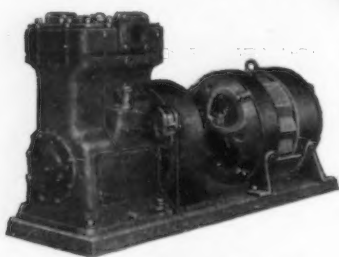
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Cupola Possibilities And Limitations

(CONTINUED FROM PAGE 23)

steady production. When really steady production is assured, either electric duplexing, or the assignment of a cupola and a gang to the steady production of 3 per cent carbon iron direct from the cupola, would be resorted to.

A little special equipment will be necessary in using these methods. Naturally, hot-blast cupolas will be helpful in holding the temperature up. Every precaution to secure uniformity in the performance of the cupola must, of course, be taken, and the development of instruments and control methods to facilitate uniformity is an extremely worth while task, one that will justify research. Hot-blast cupolas are not out of reach of the small foundry, since Mackenzie¹⁶ has described a simple type and the Griffin cupola, described by Fiske¹⁷ will, it is understood, be installed and allowed to pay for itself out of the coke saving it brings over previous cold-blast practice.

A heated forehearth will be needed, preferably one into which the metal flows constantly and is thus more promptly removed from contact with coke since every point of carbon pick-up that can be avoided is a gain. Possibly even the provision of two tapping spouts and two such forehearts may be called for, so that metal may be allowed to accumulate alternately in each for mixing and to give time for soda-ash treatment, when required, for taking chill test samples by which next steps of treatment and the final silicon addition are determined, and where these steps and additions, plus any needed alloy addition, may be made in unhurried fashion. (Development of suitable rapid tests is an important factor in control.)

The soda-ash treatment and the removal of silicon by oxidation are best carried out on a basic lining. Therefore, the forehearts should be basic lined and suitable provision made for slag disposal. Such forehearts would conveniently be made tilting. Firing would probably be by gas or oil.

The complete design of such forehearts would depend on the desired capacity, the particular process steps selected, and the heat input thereby required to bring the metal to the ladle at the proper temperature. This is an

¹⁶ J. T. MacKenzie, "The Moore Hot-Blast Cupola," Transactions of American Foundrymen's Association, Vol. 39, 1931, pp. 197-203.

¹⁷ R. A. Fiske, "Iron Refined by Griffin Duplex Process," THE IRON AGE, Vol. 134, Sept. 27, 1934, pp. 13-17.

other specific research problem, but there is nothing about it to require a very high installation cost.

In oxidizing carbon or silicon with ore or mill scale, it may be desirable to preheat the ore in some simple heating furnace.

There seems to be nothing fundamentally difficult about the practical application of the methods suggested. They need further development before they can be appraised exactly, but so far they look feasible both technically and economically. They are suggested as deserving the further research that will make them practical accomplishments.

James Gleason Awarded A.S.M.E. Gold Medal

FOR distinguished services to the automotive industry, by making possible better and safer gear drives, James E. Gleason, president and general manager, Gleason Works, Rochester, N. Y., has been awarded the American Society of Mechanical En-



JAMES E. GLEASON

gineers Gold Medal for 1939. The medal was presented during the annual meeting of the society, held at Philadelphia, Dec. 4-8.

The Ebco Mfg. Co., 401 W. Town Street, Columbus, announces the leasing of its porcelain enameling department to the Dayton Porcelain Enameling Co., which has discontinued operations at its Dayton end and is transferring its entire operation to the Ebco plant. The Ebco company manufactures water coolers, drinking fountains, metal plumbing enclosures, sinks and sanitary-ware, and the Dayton company, it is understood, has contracted to enamel a large percentage of the products of the Ebco company.

Fabricated Steel Orders Declined in November

SHIPMENTS of fabricated structural steel during November were in normal volume, although new orders further declined, according to the reports received by the American Institute of Steel Construction. From this it would appear that the September and October orders were the result of hurried placing of contracts immediately after the declaration of war in Europe. The total shipments for the 11 months of 1939 exceed the shipments for the similar period last year by 25.2 per cent.

The total of new orders booked during the 11 months of the current year were 49.2 per cent of the average total bookings for the same 11 months of the years 1923-1925 inclusive (11/12 of 2,675,000 tons), which were compiled by the U. S. Department of Commerce. The 1923-1925 base is used for comparison with the charts, "Construction Contracts Awarded," currently appearing in the monthly *Survey of Current Business* published by the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce, which are based on the index, 1923-1925 = 100.

Micromatic Hone Corp. Doubles Its Floor Space

DETROIT—Micromatic Hone Corp., manufacturer of honing machine tools, has recently leased additional space at 1349 E. Milwaukee St., Detroit, practically doubling the total space formerly occupied. Further additions of machinery have substantially increased the extent of its production capacity. The company will close the current year with the greatest backlog of unfilled orders in its history, according to Kirke W. Connor, president.

Ledloy Output Abroad Gains

MORE foreign manufacturers are taking advantage of the free machining qualities of Ledloy, the lead-bearing open-hearth steel announced by Inland Steel Co. in 1937. In England, Ledloy was first produced by Guest, Keen Nettlefolds, Ltd., through its subsidiary, Exors of James Mills, Ltd., at Bredbury. More recently, Guest, Keen & Baldwins, Ltd. at Cardiff, have started production of Ledloy. United Steels, Ltd., and the Parkgate Steel & Iron Co., Ltd., will be in production shortly. Ledloy also is being stocked in France, Sweden and Holland, Inland reports.



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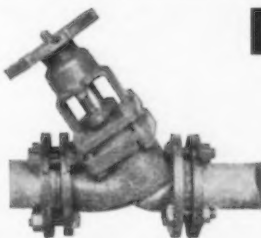
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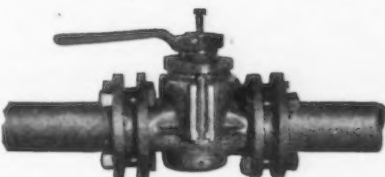
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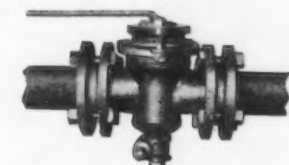
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(CONTINUED FROM PAGE 45)

hibit (Mr. Witt's report to the board on the Pittsburgh conference with SWOC officials) and read it, and will you tell the committee whether or not you agreed on the 2nd day of June with the two individuals named therein to a plan whereby this board would receive a charge and issue a complaint, and determine then and there that in order to carry out the purposes of the act, that a principal agreement was necessary where there was a majority or exclusive representation?"

Mr. Witt: "Mr. Toland, I couldn't bind the board in anything I said to Messrs. Murray and Pressman in Pittsburgh on June 2, nor was I binding the board in this memorandum which I prepared on June 3, to make a finding ultimately after the case was heard that this was a violation of the act. All this came to was saying that within the terms of the act as written, a charge could be filed under these circumstances, and that takes place in every regional office in the country, day after day. I don't mean just this particular office."

Asks if Witt Urged Action

Mr. Toland: "Didn't you urge them to do that? Didn't you sit there and discuss the various companies, the membership that they had, agree with them that the Inland was the best case to try out this problem, and that you at that time agreed or indicated that so far as you were concerned that a written agreement was necessary under this act?"

After Mr. Witt protested that "there is so much in that question I scarcely know where to begin," Mr. Toland broke the query down this way:

"Is it a fact or is it not a fact, Mr. Witt, that you sat there with the two individuals, Mr. Pressman and Mr. Murray, and surveyed the membership of the SWOC that they had of employees in the Republic, the Youngstown and the Inland Steel?"

Mr. Witt: "That is true in the same way that any of our regions and any of our regional offices."

Mr. Toland (interposing): "I didn't ask you that, I am not asking you about the regions. I am asking what you did, and what they did."

Mr. Witt: "Well, I am not sure I can answer that question, Mr. Toland."

Mr. Toland then read again from the Witt memorandum, but Mr. Witt insisted that no reference was made to his surveying the SWOC membership in the three companies.

Mr. Toland (reading again from the

memorandum): "'Since the presentation of the question to the board is tied up with the question of the majority, I explored the latter question first with Murray and Pressman.' What did you explore? How many members they had at each company, didn't you?"

Mr. Witt: "Not exactly how many members. I explored the question as to whether they had a majority in the case of any company."

Mr. Toland: "Isn't membership tied up with majority, too?"

Mr. Witt: "Well, of course it is. I didn't understand the use of the word survey."

Mr. Toland (after reading further from the memorandum): "Now, isn't it a fact that on that day in the City of Pittsburgh, as the result of your conference with these people, and that as the result of the suggestions that you made to them, that the SWOC made a demand on Inland, and that as soon as the demand was received that Inland refused, and that as soon as they refused, or were notified, and as soon as you were notified a charge was filed by the union?"

SWOC Made Demand on Inland

Mr. Witt: "I don't recall all that being true. I think I recall that as the result of this conference, SWOC did make a demand on Inland."

Mr. Toland: "Let me see if I can't refresh your recollection."

Mr. Witt: "I am not finished with my answer. I do recall as the result of this conference SWOC did make a demand on Inland Steel. I wouldn't be sure whether it was on that day or not. I wouldn't be surprised if it was. I recall that Inland's answer to the telegram was to reject the demand by SWOC. I don't recall when the charge was filed, or I don't recall anything with respect to the latter half of Mr. Toland's question."

Under further questioning, Mr. Witt related, however, that on that same day he communicated with Board Member Smith and with the NLRB regional director in Chicago.

Representative Charles A. Halleck, Republican of Indiana, addressing Mr. Witt further: "Directing your attention to the latter part of the second paragraph, you said this:

"'All other things being equal, Inland would probably refuse the request on the ground that collective bargaining does not require a written agreement, even if the parties come to an understanding on the provisions, as they apparently have in this case, on

the basis of the Carnegie-Illinois agreement.

"'If at the same time as it makes the demand SWOC also offered to prove to Inland before the conference that it represents a majority, then Inland's refusal to negotiate on such a basis would lead to a claim by SWOC that section 8 (5) had been violated.'

Admits Planning "Strategy"

"Was that whole strategy talked over by you and Mr. Murray and Mr. Pressman?"

Mr. Witt: "I don't recall specifically, Mr. Halleck, but I wouldn't be surprised if it was."

Mr. Halleck: "Your memorandum has to do with the conference that you had with these gentlemen?"

Mr. Witt: "Yes, but it doesn't—"

Mr. Halleck (interposing): "I rather assume from the fact that it was in this memorandum that it had been a topic of discussion between you three gentlemen."

Mr. Witt: "I think that would be a fair assumption."

Mr. Halleck: "Now, the thing I am wondering about is this: Do you think that this in a measure involved a strategy of entrapment for the Inland Steel, calculated to result in a situation—a situation presented in such a manner as to get them into a position where you could subsequently crack down on them with a charge?"

Mr. Witt: "No, I don't think so, Congressman Halleck. I am sure that was the farthest thing from my mind."

After a further interchange of questions and answers, Mr. Halleck continued:

"Now I direct your attention also to these words in the third paragraph. You refer back to this man, the director, checking his books to see whether they are in shape, and then you say this: 'If they are, SWOC will make a demand on Inland in the above terms, and upon refusal will file a charge.'

"You don't think that indicates a kind of strategy laid out here to entrap the Inland Steel Co.?"

Mr. Witt: "No, Congressman Halleck, I wouldn't put it that way."

Mr. Halleck: "In any event, Mr. Witt, as I understand it, you and these gentlemen of the SWOC had conferred and talked over this whole strategy and laid out the successive steps that were to be taken, and apparently you at least had concluded that the result of it would be that the Inland would kind of get off base,

and so to speak put its foot into the situation that would result in the charge being filed."

Objects to Use of Word "Strategy"

Following a statement by Mr. Witt, protesting against use of the word "strategy," Mr. Halleck continued:

"Did you conceive this plan or strategy, or whatever you want to call it, or did Mr. Pressman and Mr. Murray conceive of this line of action,"

Mr. Witt: "I don't recall that any particular one of us did. This grew out of our discussion in Pittsburgh."

Mr. Halleck: "You say down there in the third paragraph that you left the problem with Murray and Pressman. Does that to your mind imply that you had gone there with this plan, and left it with them?"

Mr. Witt: "Well, it does, Mr. Halleck, in the sense that the next move was up to them. I doubt very much whether I would have gotten in touch with them again if they had filed no charge or if they had not sent this telegram. It was their problem if they were interested in pursuing their remedies under the act, instead of on the picket line."

After Representative Arthur D. Healey pointed out that there is nothing in the Wagner Act or in the board's regulations precluding a consultation where there appears to be a violation of the act, Representative Routzohn insisted, on the other hand, that there is nothing in the law which specifically permits such a practice.

Mr. Routzohn: "... is there anything, either in what Mr. Murdock has read to you (from portions of the Interstate Commerce Commission Act), or in the act governing your actions, which authorizes the board or any member thereof, or any employee of the board, to meet with one side of a controversy and enter into a plan or conspiracy to promote the filing of charges before the board? You can answer that yes or no."

Expressing doubt that he could answer the question, Mr. Witt continued:

"As I read this act, it seems to me it is difficult to have any other procedure except the procedure under which the board consults first with the party filing the charge. I am familiar with thousands of cases which have now been filed with the board, and I don't know of a single case in which the union and the employer came to the board together for the purpose of filing a charge."

Subsequent testimony disclosed,

however, that although Mr. Witt had complete charge of the situation involving Inland Steel, he did not meet with officials of the company.

Mr. Routzohn: "Yes, and up to this point you had not met with the Inland or any of the other officials of any of the other companies involved in the strike. Is that correct?"

Mr. Witt: "That is correct in the same way when a union official files a charge in a regional office at 5 o'clock this afternoon, the regional director will not have a conference with the representative of the company until, perhaps tomorrow, perhaps not until next week, or perhaps not until next month."

Asked by Congressman Routzohn if he was familiar with the legal term "champerty"—stirring up of strife and law suits—Mr. Witt replied in the affirmative.

Mr. Witt: "It seems to me, Congressman Routzohn, that what the board was trying to do in this case was to bring very serious strife to an end."

Mr. Routzohn: "What you were attempting to do is what you state in your letter, and what Mr. Halleck has stated, was to entrap the Inland Steel Co. into a position where charges could be filed and the board could assume authority under those charges."

Mr. Witt denied the allegation.

After the two Congressmen contin-

ued for several minutes to shoot questions at the witness, Chairman Howard W. Smith, anti-New Deal Democrat of Virginia, directed Mr. Toland to continue.

"Thank you," Mr. Toland replied. "I thought for awhile I was forgotten."

Mr. Toland: "Wasn't the substance of the conference a question, sir, on the part of SWOC to obtain a written agreement from the Inland Steel?"

Mr. Witt: "Well, that was the issue in the strike, if that is what you mean."

Admits Working Out a Plan

Mr. Toland: "I am not talking about the strike. I am talking about your memorandum on the conference. Now, isn't it a fact that the conference between you and Pressman and Murray was to work out a plan whereby the question of compelling Inland to sign a written agreement would be raised and decided by the board?"

Mr. Witt: "Unless Inland Steel agreed?"

Mr. Toland: "Unless they consented to do it?"

Mr. Witt: "Unless they consented to do it."

Mr. Toland: "And you felt at that time Inland would not agree to do it, isn't that a fact?"

Mr. Witt: "I think so."

NAM Asks Prohibition of Closed Shop and Check-off

WASHINGTON—Barring of closed-shop contracts and check-off systems is proposed in a report of the employment relations committee of the National Association of Manufacturers which urges 12 major amendments to the National Labor Relations Act. The report was announced on Dec. 20, one day after the House committee investigating operations of the act took a recess until Jan. 5. The report said efforts of the House committee are "definitely encouraging." Listing 11 harmful results from the act and its administration the report declared that they have destroyed confidence in its fairness and administration; protected sit-down strikers and other strikers engaging in violence; been one-sided; failed to protect employees against coercion; compelled employers to bargain with unions which have violated collective

agreements; tried to prevent employers from expressing their opinions; denied the right to ordinary provisions of a fair trial; sought to destroy legitimate unions not affiliated with the AFL or CIO and exhibited hostility toward employers and their associations while championing the rights of employees to organize into associations.

12 Recommendations Made

The 12 amendments recommended and reasons given were:

Rewriting of preamble, which as it stands, was said to be objectionable because it fails to recognize employer denial of right of organization and collective bargaining is the exception and not the rule; ignores fact that majority of strikes and other obstructions to commerce are not due to unfair labor practices by employers; but

are due to practices of others, does not recognize that individual employers may be at the mercy of large labor organizations; fails to recognize that individual employees should have the right to voluntarily choose for themselves whether they wish to join any labor organization.

Revised definitions of "employees" and "current labor dispute" should be incorporated in the act.

Employers should be protected against unfair labor practices, whether practised by employers, labor organizations or fellow employees, or any other source.

Reasonable limitations upon the right to strike should be recognized, with benefits of the act withheld from those engaging in strikes without presentation of demands and grievances and reasonable opportunity for their consideration; strikes in violation of agreements; strikes to prevent or compel the use of materials, equipment or services; strikes accompanied by repeated or systematic acts of violence and intimidation; sit-down strikes, or other strikes which involve illegal act or the omission of a legal duty.

Asks Prohibition of Closed Shop and Check-off

Definite prohibition, as under the Railway Labor Act, of the closed shop and check-off. Closed shop limits and prevents the free and full exercise of both employees and employers of their bargaining rights; employee freedom to belong, or not to belong, to any labor organization is restricted by the compulsory collection, or "check-off," of union dues by deducting them from wages of employees.

Consideration should be given to elimination of the so-called majority rule provision, but if the rule is retained experience shows that other amendments must be made to make it effective and at the same time to protect those who do not wish to affiliate with the majority group.

Freedom of speech should be safeguarded by clear and appropriate language.

Employer petitions for election should be acted on by the board, and such action should be mandatory where the employer is confronted by two or more groups when one of the parties claims to represent a majority of the employees.

The board should not be permitted to make compulsory multiple-unit certifications, combining in one unit the employees of a number of employers.

A definite statute of limitations should be provided so that employers may not be proceeded against long after the occurrences to which the complaint relates.

The complaining party in any proceeding before the board should have the burden of substantiating its charges, the board's function being

NLRB Orders Elections In Several Plants

WASHINGTON—The National Labor Relations Board on Dec. 18 announced a secret ballot election would be held within 30 days among the production and maintenance employees of Wickwire-Spencer Steel Co., Tonawanda, N. Y., to determine whether they desire to be represented for the purposes of collective bargaining by Federated Industrial Union, Wickwire Local No. 106, by SWOC Lodge No. 1060 of Amalgamated Association of Iron, Steel and Iron Workers or by neither. At present the Amalgamated is the bargaining unit.

The board on Dec. 19 announced that a secret ballot election would be held within 30 days among employees of Cleveland Hobbing Machine Co., Cleveland, to determine whether they desire to be represented by the UAW-AFL or the UAW-CIO.

Upon being informed by United Electrical, Radio & Machine Workers of America (CIO), that it does not desire to participate in a secret ballot election among the employees of Westinghouse Electric & Mfg. Co., Mansfield, Ohio, the board has announced an amendment to its Dec. 4, 1939 direction of election. The board said that the employees will now vote to determine whether or not they desire to be represented for the purposes of collective bargaining, by Westinghouse Employees Association, Inc.

The board has announced the postponement of a proposed election among employees of Auburn Foundry, Auburn, Ind. An order of Aug. 31 for an election, subsequently amended twice, provided in part that a poll should be held within 60 days of Oct. 20 under the direction of the regional director in Chicago.

At the request of the union, the board has amended the form of the ballot in the forthcoming election among employees of the American Machine & Foundry Co., Brooklyn, removing the name of the United Elec-

trical, Radio & Machine Workers of America, Local 475 (CIO). Employees will now determine whether or not they desire to be represented by Employees' Association of the American Machine & Foundry Co.

Labor organizations desiring to exercise the privilege of acting as collective bargaining agents should be required to place and keep on file with the board, subject to inspection, reasonable information with respect to themselves and their responsibility.

On Dec. 6, UERMW filed with the board a petition requesting that in the event its petition for reconsideration of the board's order for an election be denied the supplemental direction of election be amended to exclude from the balloting its name. The board denied the CIO union's request of reconsideration.

The board announced last Friday that a secret ballot election would be held within 30 days among the production, shipping, and maintenance employees of Newark Rivet Works, Newark, N. J., to determine whether or not they desired to be represented for the purposes of collective bargaining by Newark Rivet Works Employees' Association.

The board has also announced an order requiring the Electric Vacuum Cleaner Co., Inc., Cleveland, to invalidate the closed-shop provisions of a May 20, 1937, contract with "five company-aided AFL unions" and further to invalidate the contract entirely when a freely chosen employee organization has been certified. The board's order also required the company to stop discouraging membership in a CIO union and to stop encouraging membership in the five AFL unions.

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Walsh-Healey Litigants Given Until Jan. 23

WASHINGTON — Counsel for the Lukens Steel Co., Coatesville, Pa., and six other independent steel mills in the East, all litigants in the pending Walsh-Healey steel wage case against Secretary of Labor Perkins, have been given until Jan. 23 to answer the Government's petition which seeks Supreme Court review of a decision handed down on Oct. 3 by the Circuit Court of Appeals for the District of Columbia.

Widespread Importance Attached To Work of Smith Committee

WASHINGTON — Widespread importance properly is attached to the investigation of the operations of the National Labor Relations Act by a special House committee headed by Representative Howard Smith, Democrat of Virginia. Pursued on the high plane with which it has started, the inquiry should develop a fair formula for Government regulation of employer-employee relations.

The conduct of the investigation is widely conceded to have been commendable. It reflected objectivity. There was no trace of a "packed" committee. There was no heckling of witnesses. Procedure has been orderly. Committee Counsel Toland showed he has carefully prepared his case. Penetrating, and keen though he is in examining witnesses, he has not sought to take advantage of his position to indulge in unfair tactics and he made no observations that he cannot support by documentary evidence. It is due to his careful preparation that many of the remarkable revelations of the maladministration of the Wagner Act have been disclosed. Were it not for prior deep suspicions of irregularities in administration of the law, the testimony already adduced would have been even more startling than it was. As it is, it confirmed charges of the board's CIO bias. More than that it revealed the amazing spectacle of CIO dictation of board policy, with its undercover movements designed to coerce industry into recognition of that labor organization. The pettiness and the vindictiveness of the board toward industry were well known but were emphasized by testimony by its representatives.

CIO Bias Proved

By their own statements board officials disclosed the fact that they conferred with CIO unions regarding the filing of charges against employers, among whom were steel manufacturers. From his testimony, Regional Director Philip G. Phillips revealed that dates for "phony" hearings were set in order to compel employers, under threat of trial, to settle cases with the CIO. Testimony of Board Member Edwin S. Smith showed the board had encouraged a boycott as a means of making an employer meet the demands of a CIO union. It was shown that at the suggestion of CIO unions

hearings were postponed when the unions, realizing they did not represent the majority of employees, wanted more time to build up their membership. There was a bright spot, however. The newest member of the board, William L. Leiserson, in his forthright testimony made it known that he had demanded the resignation of the board's secretary because of his CIO partiality and incompetence.

It is to be expected that the committee, upon resuming the investigation on Jan. 5, will continue its judicial procedure. It has already unmistakably shown by testimony of two members of the labor board, its secretary and a regional director, that a clean sweep is imperative throughout the organization, both at the top, except for Mr. Leiserson, and in the lower strata in Washington and its field offices over the country. There is a disagreement with Mr. Leiserson's view that no changes in the Wagner Act are needed in "any importance respect" but it is not questioned that he discharges his duties under the law as he conceives them.

Big Shake-up Predicted

The belief widely exists that the inquiry will result in a big shake-up in the board personnel, either through legislative action or that, anticipating such action, the Administration, much to its distaste, will take over the job. It is generally doubted that the powers of the labor board will be curbed in any important respect by Congress or the Wagner Act modified extensively. There may, however, be some curtailment in the discretionary powers of the board by clarifying the act so as to make more specific some of the provisions of the law, particularly as it relates to collective bargaining units, one of the chief sources of squabbles between the CIO and the AFL as well as within the board. Any change made, it is believed, will be in the direction of the AFL contention for greater craft union recognition.

But whatever the outcome of the House committee inquiry regarding operation of the Wagner Act, its study is a symbol of greater importance than the immediate subject under consideration. It marks a resurgence in the function of a government by checks and balances. Reflecting a reaction from the country Congress is reasserting its authority, which under

the New Deal had been surrendered so freely to the executive branch. Until recently most investigations have been New Deal dominated. Now there is a shift, as indicated by the formation of the Smith committee, toward investigating the investigators, a most wholesome trend. The hope is that Congress will now proceed to set up committees to investigate other government agencies, new and old, and there are many of them that might well be put under scrutiny to give an account to the country of their administration.

Heretofore, for the most part, it has been a field day of heckling business. So-called investigations, instead of being fair and legitimate, resembled persecutions. A classical example was the so-called Lobby committee, then headed by Senator Hugo Black of Alabama, now elevated to the Supreme Court of the United States, where he can pass judgment on imperious orders and decisions of Government bodies such as the National Labor Relations Board, or on the right to ransack private files and confiscate private telegrams, such as Black's committee did with the help of the Federal Communications Commission, a performance that was vigorously scored by the Circuit Court of Appeals of the District of Columbia. But there was no reprimand from the Administration whose cohorts now are raising a cry of the "unfairness" of the Smith committee. Other investigations have been of like tenor.

Seeing that a Presidential campaign is near, it probably is too much to expect the present Congress to order wholesale cleaning of New Deal linen because of fear of further party disaffection and consequent political defeat. No group dislikes or has reason to dislike the New Deal so thoroughly as do the so-called conservative Democrats and the feeling is mutual. But, unless open ruptures break out in the meantime, it may be doubted that they stand on the eve of a political campaign to put the New Deal on the grill. But sooner or later this will be done.

Regardless, however, of when the whole New Deal mess is explored, there is great need that the job be done. When it is done the course to be followed is the precise opposite of that pursued by New Deal-packed committees which have been witch-hunting business. A fair, orderly procedure, permitting the New Deal a free hand to present its case should be adopted. The conduct of the Smith committee is a good example to follow.

\$4 Charge Allowed for Transferring Scrap from Improperly Loaded Cars

WASHINGTON—In a decision announced last week, the Interstate Commerce Commission authorized railroads to charge \$4 per car for rearranging or 40c. per ton for transferring from one car to another shipments in open top gondolas of iron and steel scrap improperly loaded in Western trunk line and Southwestern territories. Application of these charges was proposed as the commission ordered cancellation by Feb. 1 of tariff schedules providing rates of 22.5 per cent of the first class rates on improperly loaded scrap in the affected territories. These rates were held to be unreasonable. The problem of improperly loaded cars pertains to the Western trunk line and Southwestern sections only, because, unlike in the East, it was stated their originating carriers do not own open top cars available for the bulk requirements of scrap loading.

The proposed tariff schedules were filed to enforce rules of the Association of American Railroads. The schedules proposed in substance that, if an improperly loaded car of remelting scrap is shipped over an interstate line, the shipper would be required to pay the column 22.5 rates, amounting to approximately 50 to 80 per cent higher than the rates that would otherwise be applicable. The AAR loading regulations are covered in two rules. One makes shippers responsible for safe loading of freight and protection of equipment. Another provides among other things that shippers must pay for installing wooden uprights in cars as a means of increasing capacity. This practice is known as cribbing, specifications for which are laid down by the carriers. It is necessary chiefly in order that scrap in the two affected territories may be loaded in low-side cars up to the minimum loading rate capacity of 75,000-lb., rather than to the alternate minimum weight of 50,000-lb.

Scrap dealers, protesting against the schedules, told the commission that the increased shipping costs, incurred in providing wooden cribbing or in payment of higher rates, would materially reduce the quantity of scrap shipped from points which are located substantial distances from points of consumption. Others who testified estimated that the expense of installing wooden cribbing would approximate \$25 to \$60 per car, depending largely on the local-

ity, and in some instances would more than offset the difference between the column 12.5 rates, minimum 75,000 lb. and the column 15 rates, minimum 50,000 lb. It was also urged in general that the specified wooden cribbing would be no safer than cribbing com-

Copper "Tax" Not to Be Cut in Chilean Trade Agreement

WASHINGTON — The precedent-breaking announcement by the Department of State that there will be no cuts in the import tax on copper or copper products in the pending trade agreement with Chile has aroused speculation as to whether or not Secretary of State Hull has badly dented if not wrecked a program which he is deeply involved. Heretofore the department has stood adamant against making known in advance what action it will take in a trade agreement being negotiated. Since the barrier has been broken down with respect to copper, it is predicted that the way has been opened to prevent tariff concessions on any number of products. This possibility was indicated when immediately on the heels of the department announcement, Senator O'Mahoney, Democrat of Wyoming, joining in the general jubilation of Western Senators and Representatives, said the same action was justified "with respect to beans and other articles."

Members of Congress had strongly supported Western copper mining interests and labor in their vigorous protests against reducing the copper tax—it is not called a duty. It was contended that a slash in the tax would demoralize the copper mining industry and throw thousands of miners out of work. The contention is said to have been well-founded and to have been a factor in inspiring the reassuring department announcement. However, it is maintained that the political element entered prominently in prompting the announcement. The Reciprocal Tariff Act has been bitterly assailed in Congress, especially by members from Western mining and agricultural sections who have been

posed of automobile underframes, wheels and other metal articles, a point which the carriers challenged. It is the present practice of the railroads to make charges against shipments when, due to overloading, loadings are transferred from one car to another. The commission said that current tariffs do not authorize the carriers to bill against shippers or receivers of freight the expense of readjusting or transferring shipments of scrap.

prepared to exert every possible effort to block renewal of the act upon its expiration in June.

They claimed that they would muster enough votes in the Senate to bar renewal. Secretary Hull, with administration backing, has been vigorously urging renewal of the act but is aware of the strong Congressional opposition to it. It is declared that realizing the situation he was forced to capitulate on the copper issue, hoping to placate much of the opposition and to get its support for renewal of the act. It remains to be seen whether the strategy was a success.

6,560,000 Lb. of Pig Tin Awarded by Government

WASHINGTON—Awards under the Strategic Minerals Act were made last week by the Procurement Division, Treasury Department, for 6,560,000 lb. of pig tin at prices, ranging from 47.16c. to 48.25c. per lb. The awards were apportioned as follows:

Caswell, Strauss & Co., New York, Dutch East Indies tin, 2,240,000 lb. at 47.16c. per lb.

C. S. Trench & Co., New York, Straits Settlements tin, 2,000,000 lb. at 47.44c. per lb.

Metal Traders, Inc., New York, Straits Settlements tin, 1,120,000 lb. at 48.2c. per lb.

Domestic & Foreign Commerce Corp., Washington, Dutch East Indies and Straits Settlements tin, 1,000,000 lb. at 48.25c. per lb.

American Metal Co., New York, Bolivian tin, 200,000 lb. at 47.22c. per lb.

Delivery was guaranteed within six months and, the division said, is expected to be made during the latter portion of the contract period.

U.S. Treasury Permits Charging Off Tool Cost As Indirect Factory Expense

WASHINGTON—Under a closing agreement negotiated with the Consolidated Aircraft Corp., of San Diego, Cal., the second such agreement to be approved under the profit-limitation provisions of the Vinson-Trammel and the National Defense Acts, the Treasury Department will permit the company during the period of contract performance to charge off as an indirect factory expense the cost of tools used during the period.

The company, which last week was awarded a \$20,016,699 contract for an undisclosed number of aircraft for the Navy, may also charge off as an indirect factory expense the depreciated cost, less salvage value, of certain buildings which necessarily are required to be demolished in order for the company to carry out the contract. The cost involved in making the demolition can also be charged as an indirect factory expense.

The closing agreement, made in accordance with the Internal Revenue Code, expressly refrains from fixing rates of depreciation and obsolescence with respect to any buildings, machinery, or other similar facilities required to be obtained by the company under the contract, but permits it to take a deduction with respect to the portion to be permanently discarded upon completion of the contract. The allowance covering the cost of any facility permanently discarded is subject to adjustments for depreciation and other allowances to the date the facility is discarded and for the salvage value at that time.

The deductions allowed with respect to these new facilities and the demolition of old facilities are not permitted to be treated as direct charges against the contract, the announcement said, but are to be prorated to all new work which the company may have.

It was categorically denied by the Treasury Department two weeks ago that the policy of entering into closing agreements with manufacturers represents a form of tax concession. On the contrary, it was insisted that such agreements give the contractor nothing more than could have been received ordinarily under the provisions of the law. To put it another way, the only thing the manufacturer gains by an agreement is the advantage of knowing in advance what depreciation and obsolescence allowances will be per-

mitted on plant and equipment for income-tax purposes, and for purposes of calculating allowable profit under the Vinson-Trammel Act as amended during the last session of Congress by the National Defense Act.

The Vinson-Trammel Act limits profits on naval ships to 10 per cent while the National Defense Act fixes the allowable profit on aircraft at 12 per cent.

The first closing agreement, involving the Colt's Patent Fire Arms Co., was announced two weeks ago by the Treasury Department.

Westinghouse Air Brake Gets \$264,321 Chilean Order

WASHINGTON — James W. Young, director of the Bureau of Foreign and Domestic Commerce, has announced that the Argentine State Railways has awarded a contract for air brakes, in the amount of \$264,321, to the Westinghouse Air Brake Co.

Wage-Hour Enforcement To be Tightened

WASHINGTON—A decentralization move aimed at tightening the enforcement of the Fair Labor Standards Act has been launched by Col. Philip B. Fleming, executive director of the Labor Department's wage-hour division. Under the new procedure, more responsibility has been transferred to the agency's field staff. Violators desiring to make restitution of wages to bring them into compliance with the law will be permitted to pay employees on the installment plan, and the agency will crack down on cases involving falsification of records and other flagrant violation by instituting criminal prosecutions.

The decentralization plan, arrived at in the light of the agency's experience during the first year of operation under the law, gives wider discretion to ranking regional officers in differentiating between flagrant violations and those where a mere restitution of wages will be sufficient to close a case. The division now has 666 field employees, including 390 inspectors. A year ago the maximum was 125. The division argues that the increase in its staff will help to expedite the handling of complaints.

According to the wage-hour division's latest interpretive bulletin, revised to take into account the reduction in the maximum work-week from 44 to 42 hr., effective Oct. 24, 1939, the act takes a single work-week as its standard and permits no averaging of hours over two or more weeks. Hence, where an employee works 32 hr. one week and 52 hr. the following week, he must receive time and one-half overtime compensation for the 10 hr. over 42 worked the second week, even though the average number of hours worked in the two weeks is 42.

Swedish Steel Industry Considers a Pooling Scheme

WASHINGTON—Reports to the Commerce Department indicate that Sweden is considering a plan to regulate iron and steel prices through establishment of a control board with a pool buying the output of mills at prices covering overhead plus a reasonable profit, taking over imported iron and steel and selling it at an average price appreciably below existing prices for imports.

Another suggested plan, according to information received by the Department from Stockholm, would require Swedish mills to transfer part of their profits to the pool, thereby compensating for losses suffered by selling imported iron and steel below cost.

The announcement noted that considerable opposition to the pooling proposal has developed, particularly from the Domnarfvet mill which, with a huge output and integrated production methods, has been in a position to compete with the international steel cartel. The report attributed Sweden's ability thus far to remain outside the cartel to Domnarfvet's independent position.

Navy Awards Additional Large Airplane Contracts

WASHINGTON—The Navy Department's Bureau of Supplies and Accounts last week awarded a \$20,016,699 contract to the Consolidated Aircraft Corp., San Diego, Cal., for airplanes; a \$7,927,272 contract for aircraft engines to the Pratt & Whitney Division, and a \$1,293,647 contract for propeller assemblies to the Hamilton Standard Propellers Division, United Aircraft Corp., East Hartford, Conn.

A \$163,961 contract, also for propeller assemblies, was awarded Curtiss-Wright Corp., Clifton, N. J.

Manganese Ore Bids Received by U. S.

WASHINGTON—The following bids on 48 per cent manganese ore per unit of 22.4 lb. were opened on Dec. 19 by the Procurement Division in response to invitations for tenders on 2000 to 45,000 gross tons each at the United Army Depot, Curtis Bay or Baltimore Harbor, Md., and 2000 to 15,000 tons, United States Army Depot, Ogden, Utah:

Foreign sources, f.o.b. cars Curtis Bay or Baltimore Harbor, Md.: Commercial Engineering Co., Inc., Washington (Canada), 45,000 tons, 60c.; Derivatives, Inc., New York (South Africa), 78,000 tons, 56c.; W. R. Grace, New York (Coquimdo, Chile), 2000 tons, 48.5c.; W. H. Miller & Co., New York (Durban, South Africa), 5000 tons, 47.95c.; Rosslyn Manganese

Corp., Santiago, Cuba: 5000 tons, grade A, 62c.; 5000 tons, grade B, 61c.; 5000 tons, grade C, 60c. (Grades differentiated by silica, alumina and phosphorus content.)

Domestic sources, f.o.b. cars Curtis Bay or Baltimore Harbor, unless otherwise indicated: Great Valley Manganese Corp., Pekin, Va., 5000 tons, 75c.; Greenbrier Mining Corp., White Sulphur Springs, W. Va., 10,000 tons, 75c.; Luna Manganese Corp., Jackson, Mich. (mines at Carne and Deming, N. M.), 15,000 tons, Ogden, 80c.; North American Manganese Corp., Glennwood, Ark., 500 tons, 70c. Ogden; Raymond B. Oliver, Alta Vista, Va., 45,000 tons, \$1.041; Domestic & Foreign Commerce Corp., Elizabethton, Tenn., 5000 tons, grade A, 62c.; 5000 tons, grade B, 61c.; 5000 tons, grade C, 60c.

Government Contracts

WASHINGTON — Government contracts for iron and steel products, as reported by the Labor Department's Public Contracts Division for the week ended Dec. 16, totaled \$529,050. For the same period contracts for non-ferrous metals and alloys reported to the division totaled \$514,455; and for machinery, \$783,322. Details follow:

Iron and Steel Products

Wire Rope Corp. of America, Inc., New Haven, Conn., Navy S & A, wire rope	\$35,370.00
M. K. Epstein Co., Springfield, Mass., Navy S & A, furnace, car bottom	13,735.00
Dempsey Industrial Furnace Corp., Springfield, Mass.; Philadelphia Drying Machinery Co., Philadelphia, Navy S & A, gas fired furnace	10,303.00
Electro Metallurgical Sales Corp., New York, Navy S & A, ferro-manganese	21,580.00
Electro Metallurgical Co., Niagara Falls, N. Y.; Lynchburg Foundry Co., Lynchburg, Va., Panama Canal, water cast-iron pipe	13,870.56
Carnegie-Illinois Steel Corp., Vandergrift, Pa., War Ordnance, terne plate	17,785.00
Taylor-Parker Co., Inc., Norfolk, Va., Procurement, anvils	Indefinite
Henry Disston & Sons, Inc., Philadelphia, Procurement, rakes	Indefinite
MacWhyte Co., Kenosha, Wis., Phila. Navy Yd., tie rods	21,580.94
Beacon Devices, North Tonawanda, N. Y., Phila. Navy Yd., steel cylinders	19,500.00
Fair Mfg. Co., San Francisco, Navy Purch. Office, structural steel	14,189.09
Treadwell Engineering Co., Easton, Pa., Navy S & A, gun saddles	36,850.00
A. M. Castle & Co., San Francisco; Lukens Steel Co., Coatesville, Pa., Navy Purch. Office, plate steel	43,649.46
Cleveland Chain & Mfg. Co., Cleveland, U. S. Coast Guard, buoy chain	12,064.67

McKay Co., York, Pa., U. S. Coast Guard, buoy chain	14,076.43
Kerlow Steel Flooring Co., Jersey City, N. J., WPA, floor grating	14,505.00
Midvale Co., Philadelphia, Navy Sec'y's Office, gun barrel forgings	12,998.88
Pittsburgh-Des Moines Steel Co., Pittsburgh, War CWS, gas holder	25,890.00
Wyckoff Drawn Steel Co., Pittsburgh, War CWS, steel	86,444.51
Lukens Steel Co., Coatesville, Pa., D. C. Navy Yd., plates	43,224.48
Eastern Rolling Mill Co., Baltimore, Navy S & A, sheet steel	9,526.38
American Chain & Cable Co., Inc., Bridgeport, Conn., U. S. Coast Guard, buoy chain	14,446.35
Woodhouse Chain Works, Trenton, N. J., U. S. Coast Guard, buoy chain	16,801.09
Leach Co., Oshkosh, Wis., U. S. Coast Guard, buoy shackles	12,739.35
Tippett & Wood, Phillipsburg, N. J., U. S. Coast Guard, buoys	17,920.82

Nonferrous Metals and Alloys

Chase Brass & Copper Co., Inc., Waterbury, Conn.; Chase Metal Works Plant, Waterville, Conn., Navy S & A, pipe and tubing	\$55,975.19
Revere Copper and Brass, Inc., Baltimore; Revere Copper and Brass, Inc., Rome, N. Y., Navy S & A, pipe, brass, copper	56,311.42
Sumet Corporation, Buffalo, Procurement, brass	Indefinite
Aluminum Co. of America, Alcoa, Tenn., Phila. Navy Yd., aluminum sheet bar	332,942.00
American Brass Co., Waterbury, Conn., Phila. Navy Yd., copper-nickel tubing	12,449.40
Revere Copper & Brass, Inc., Baltimore, Md., Navy S & A, condenser tubes	18,855.50
Magna Mfg. Co., Inc., Haskell, N. J., War Ordnance, powdered magnesium	17,082.00
The American Brass Co., Waterbury, Conn., War Ordnance, cups	20,840.00

Machinery

Consolidated Machine Tool Corp., Rochester, N. Y., Navy S & A, planer	\$248,550.33
EA Laboratories, Inc., Brooklyn, Navy S & A, electric horns	11,475.00
The Lodge & Shipley Machine Tool Co., Cincinnati, Navy S & A, engine lathes	10,166.00
Gisholt Machine Co., Madison, Wis., Navy S & A, turret lathes	32,390.10
Tidewater Supply Co., Inc., Norfolk, Va., Navy S & A, milling machines	17,309.56

New Britain-Gridley Machine Division, New Britain Machine Co., New Britain, Conn., War Ordnance, chucking machine	20,580.00
Niagara Machine & Tool Works, Philadelphia, Phila. Navy Yd., squaring shears	10,980.00
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, Phila. Navy Yd., milling machine	19,571.65
Lake Erie Engineering Corp., Buffalo, Phila. Navy Yd., hydraulic press	29,900.00
W. E. Shipley Machinery Co., Philadelphia; Universal Boring Machine Co., Hudson, Mass., Phila. Navy Yd., boring machine	10,651.00
Brown & Sharpe Mfg. Co., Providence, R. I., Phila. Navy Yd., grinders	12,155.20
Warner & Swasey Co., Cleveland, Phila. Navy Yd., turret lathes	10,328.00
Monarch Machine Tool Co., Sidney, Ohio, Phila. Navy Yd., lathes	18,539.50
W. E. Shipley Machinery Co., Philadelphia; Bryant Chucking Grinder Co., Springfield, Vt., Phila. Navy Yd., grinding machine	17,370.00
Bodine Corp., Bridgeport, Conn., War Ordnance, drilling machines	11,190.00
Rotor Tool Co., Cleveland, Phila. Navy Yd., pneumatic drills	15,986.25
Taft-Peirce Mfg. Co., Woonsocket, R. I., D. C. Navy Yd., tools and fixtures	13,494.00
Leece-Neville Co., Cleveland, Norfolk Navy Yd., diesel engine parts	17,693.65
Caterpillar Tractor Co., Peoria, Ill., Procurement, tractors	84,805.00
Caterpillar Tractor Co., Peoria, Ill., Navy Marine Corps, tractors	22,680.00
Esco Engineering & Sales, Inc., Detroit, D. C. Navy Yd., tools and fixtures	15,311.90
Bullard Co., Bridgeport, Conn., Navy S & A, turret lathe	15,503.41
Struthers-Wells-Titusville Corp., Titusville, Pa., Navy S & A, steering gears	87,312.00
Hydraulic Press Mfg. Co., Mount Gilead, Ohio, Navy S & A, hydraulic presses	14,140.00
Thew Shovel Co., Lorain, Ohio, Panama Canal, shovels	15,240.00

Luxemburg Steel Industry Experiencing a Boom

WASHINGTON — Luxemburg's iron and steel industry, with mills operating at the rate of 23 days a month, is experiencing a boom because of war conditions; orders are coming in from all parts of the world, and the present outlook is for an intensification of activities instead of the usual seasonal slackening.

Information furnished the Commerce Department by the American Legation in Luxemburg pointed out that the principal buyers are the Netherlands, the Scandinavian countries, Switzerland, Great Britain, Germany and Belgium but said that substantial orders are being received from the Far East and South America.

Figures supplied in the report indicated that during the January-October period of 1939, Luxemburg's iron production totaled 1,569,235 tons against 1,219,968 tons in the corresponding period of 1938. The steel output during the same two periods totaled 1,502,516 and 1,155,794 tons respectively.

1939 Steel Ingot Output Comes Close to 1937 Total

By WALTER S. TOWER

Executive Secretary, American Iron and Steel Institute

DURING the closing months of 1939 the production of steel ingots in the United States rose to new heights for all time.

For the year as a whole the output is estimated at 46,800,000 gross tons (including electric and crucible), compared with 28,200,000 gross tons in 1938 and with 50,318,000 gross tons in 1937.

The average rate of operations for the first quarter of the year was 54.5 per cent of capacity. For the second quarter it stood at 50.8 per cent, rising to 62.2 per cent in the third quarter and to an estimated 91.2 per cent in the fourth quarter.

Slightly more than one-third of the year's output of steel was produced in the final three months. October, November and December broke all earlier monthly records of tonnage produced.

One important cause of the sharp upturn was the prompt decision of steel users to rebuild their stocks of steel. In many cases these stocks were subnormal, a condition which called for prompt correction in view of the indicated increase in industrial activities and possible uncertainties of continued quick deliveries. No evidence has appeared that inventories of steel are being increased beyond reasonable levels relative to current use.

Two other specific causes of the rise in steel output to such high levels was the great volume of automobile production in the last quarter, and the unexpectedly large increase in demand from the railroads. Shipbuilding also continued at an active rate.

With advancing operations in the mills there were steady gains in employment and earnings of wage earners during the year.

Average employment for 1939 was 482,000, but in October the total stood at 545,000. Average weekly earnings in October were \$32, a gain of \$8 per week since mid-summer. Employees were working an average of 38 hr. each week compared with 31 hr. in October, 1938. Average hourly earnings at 84c. were the highest for any year in the history of the industry, and total payrolls in the industry in 1939 totaled \$810,000,000 against \$600,000,000 in 1938.

Rising operations have resulted in some improvement in earnings. During the past 10 years the annual return on invested capital in the steel industry has averaged only 2.4 per cent. In the first half of 1939 the industry earned \$25,450,000, equivalent on an annual basis to a return of 2.1 per cent on capital investment. This compares with a loss of \$18,000,000 in the first half of 1938.

Further gains in earnings for most companies were reported for the third quarter and continued betterment is expected for the fourth quarter.

During September the prices of many kinds of raw material used in the steel industry advanced sharply. However, the prevailing published prices of finished steel were reaffirmed by leading companies both for the

fourth quarter and for the first quarter of 1940. That action was widely regarded as a desire on the part of the steel companies to avoid any step which might stimulate inflationary tendencies in commodity prices. It is worth noting that, although average steel prices are less than 3 per cent above the 1929 level, average wage rates in the industry are nearly 30 per cent over 1929.

In November various executives in the steel industry appeared before the Temporary National Economic Committee in Washington in connection with the Committee's study of the industry. The testimony of the executives constitutes a full and frank record, illuminating many phases of the steel business, and effectively disposing of many unfounded, but persistent, popular notions pertaining to practices and conditions in the industry. Chiefly the testimony made clear that keen competition exists in the industry in all its phases, including prices.

In various respects, therefore, the steel industry approaches the end of 1939 in a more satisfactory condition than has been the case for several years.

... PIPE LINES ...

Southeastern Pipe Co., Atlanta, Ga., a joint interest of Pure Oil Co., Chicago, and Gulf Refining Co., Pittsburgh, is completing surveys for new welded steel pipe line from Port St. Joe, Fla., to terminal station at Lookout Mountain, Ga., near Chattanooga, Tenn., about 456 miles, for gasoline transmission. Right of way includes terminal service at Atlanta, Ga., where bulk station will be located. Line will be 8-in. for submarine sections in Apalachicola River and Intercoastal Canal, near White City, Fla., to be laid from 9 to 13 ft. below mean low water. Pumping stations will be installed along route for booster service. Work is scheduled to begin early in 1940. Cost about \$5,000,000.

Rockport, Tex., plans steel pipe line system for natural gas distribution, including welded steel pipe line for connection with supply source. Bids will be asked soon.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Jan. 3 for steel pipe and fittings (Circular 392).

Magnolia Pipe Line Co., Magnolia Building, Dallas, Tex., an interest of Magnolia Petroleum Co., same address, has approved plans for new welded steel pipe line from Corpus Christi, Tex., to San Antonio, Tex., about 138 miles, for gasoline transmission, and will carry out construction with company forces. Pumping stations will be installed for booster service. Cost over \$400,000. Company also plans welded steel pipe line from point near Kenedy, Tex., where tract has been acquired for new tank farm, to connection with main system in that district, for oil transmission to new plant, which will secure supply from this source.

Southern California Gas Co., 810 South Flower Street, Los Angeles, has let contract to Signal Pipe Line Construction Co., 2375 California Street, Long Beach, Cal., for 4½-

in. steel pipe line in Sepulveda Boulevard, from Gamut Place to Brand Boulevard, for gas transmission, and for reclaiming pipe of same size.

Board of Harbor Commissioners, Long Beach, Cal., has asked bids for construction of series of submarine steel pipe lines beneath and across entrance channel of Long Beach harbor, from east to west side of channel. Installation will be made for following companies, which will furnish pipe of sizes noted, fittings and accessories for project; Long Beach Oil Development Co., Long Beach, one 8-in. line; Lomita-Signal-Wilmington Associates, Wilmington, Los Angeles, one 10-in. line; Long Beach Harbor and Water Development, two 14-in. lines, and Long Beach Gas Department, two 10-in. lines.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Jan. 17 for piping system for gasoline distribution and storage tanks at naval air station, Alameda, Cal. (Specifications 9505).

Ministry of Finance, Mexico, D.F., plans 12 to 16-in. pipe line from Posa Rica gas field district to Mexico City, about 125 miles, for natural gas transmission for distribution at latter place. Proposed to use cast iron, welded joint, pressure pipe. Booster stations will be installed. Cost over \$650,000.

Census Schedules Sent to Metal-Working Concerns

WASHINGTON—The Bureau of Census has just sent out schedules on manufactures for 1939 covering the iron and steel, foundry and machinery industries. The scope of the schedules was described in *THE IRON AGE* of Nov. 30.

PERSONALS

FRANCIS H. BROWNELL, heretofore chairman of the executive committee of Revere Copper & Brass, Inc., New York, has been elected chairman of the board, to succeed the late Barton Haselton, and C. DONALD DALLAS, president, has been elected chairman of the executive committee.



E. P. GEARY, who recently returned from England where he was assistant managing director of British Stainless Steel, Ltd., has been appointed assistant vice-president in charge of sales for Rustless Iron & Steel Corp., Baltimore. Formerly he was Mid-western sales manager of the Rustless company. For 13 years Mr. Geary was associated with Vanadium Alloys Steel Co. and Colonial Steel Co. in various capacities.

ALEXANDER L. FEILD has been appointed director of chemical research for the Rustless company. He will remain in charge of patent activities and continue as consulting metallurgist. He has been with the company since 1931. Before that he was research engineer and melting superintendent for Simonds Saw & Steel Co. and has been associated in metallurgical research with the U. S. Bureau of Mines, Union Carbide & Carbon Corp., and Central Alloy Steel Corp.



D. F. McCANDLISH, formerly manager, Oklahoma City district for Air Reduction Sales Co., has been appointed manager, Detroit district, with headquarters at 7991 Hartwick St., Detroit. Mr. McCandlish joined the Purox Co., division of Compressed Gas Corp., 15 years ago, and later was appointed branch manager at Kansas City. Then he became district manager, Tulsa office, of the Stooddy Co., and in 1931 joined the Los Angeles office of Air Reduction. For the past four years he has served as district manager of the Oklahoma City office.

G. J. DEKKER, formerly assistant manager of the Detroit district has been appointed manager of the Oklahoma City district. Prior to this appointment Mr. Dekker, who has been associated with Air Reduction for more than 20 years, served as assistant manager in the Chicago, Cleveland and Detroit offices.



R. E. DENSMORE, who has been identified with the refrigeration indus-

try for 25 years, has resigned his position with the Norge Corp. He first became associated with the industry in 1914 and left the Kelvinator Corp. in 1929 to join the Norge company. Plans for the future have not been announced, Mr. Densmore meanwhile taking a vacation at South Jacksonville, Fla.



GEORGE F. BAUER has resigned from the staff of the Automobile Manufacturers Association, where he has been secretary of the export committee, to establish offices in New York as international trade counsellor.



FRED K. MCCARTHY, assistant sales manager, has been named manager of the Cincinnati branch of the National Lead Co. He succeeds the late William A. Dail. The new branch manager has been with the National Lead Co. since 1935.



C. GRINDROT has been appointed sales engineer, Wyckoff Drawn Steel Co., Pittsburgh, with headquarters at the company's Chicago office.

THOMAS M. PURTELL has been made district manager of sales for the Connecticut territory, with headquarters at 125 Trumbull Street, Hartford.



HARRY E. SCHANK has been named chief engineer of the McCord Radiator & Mfg. Co., Detroit, it has been announced by J. H. Cooper, works manager. Mr. Schank joined the McCord organization in 1922 as research engineer and since early 1928 has been in charge of radiator design and development.



LARRY C. INMAN has been elected president of the Detroit Association of Manufacturers' Representatives. WALTER F. HAEFELE and WILLIAM J. LAMPING were named first and second vice presidents, respectively, and HARRY W. GREEN was elected secretary-treasurer. The board of directors includes R. J. CONNELLY, C. R. ROLLINGS, W. H. HAGENMEYER, H. J. DECRICK and P. W. VANDERCOOK.



A. O. SCHAEFER, engineer of tests for the Midvale Co., Philadelphia, Pa.,

discussed "Heavy Forgings" before the Milwaukee chapter of the American Society for Metals meeting at the Milwaukee (Wis.) Athletic Club December 19.



JAMES B. FISHER, vice-president and chief engineer, Waukesha (Wis.) Motor Co., spoke on the development of the motor firm's new multi-fuel engine before the Milwaukee Engineers' Society, illustrating his lecture with slides and equipment demonstrating the effect of turbulence in the combustion chamber.

J. & L. Gives Union Men \$25,000 in Back Pay

PITTSBURGH—Following negotiations lasting more than a year between Jones & Laughlin Steel Corp. and the Steel Workers Organizing Committee, 23 employees, allegedly dismissed for union activities, shared last week in \$25,000 back pay, and at least 25 other employees obtained readjustments in their seniority rights. All of the employees involved were from the company's Aliquippa, Pa., plant.

In an agreement signed last week with the union, Jones & Laughlin refused to admit the charges made by the SWOC were true but in order to clean up the old cases which antedate the present contract between the steel company and the union, negotiations were brought to a close and final action taken regarding the employees in question. The SWOC, in turn, agreed to withdraw charges which had been preferred against the company to the NLRB, to the effect that the company had violated certain sections of the Wagner Act.

The amount of money originally sought by the union approximated \$50,000 but with deductions for wages earned by employees after leaving the company, the final settlement was about halved. All of the men figuring in on this recent settlement had been reinstated by the company more than a year ago.

The original friction between Jones & Laughlin and the SWOC involved more employees than those cited in last week's agreement but subsequent meetings brought the figure down considerably after the union had agreed that many of the original dismissals were not material to the question under discussion.

New Jersey Iron Mines Producing More Ore

IN a recent survey of the iron industry in New Jersey the State Department of Conservation and Development found that as a result of war activities and the increased domestic demand for iron, three of the modernly equipped iron mines in the northern half of the State are producing practically at capacity, with a strong possibility that the total production of ore for the year will nearly equal the record of 932,762 tons established in 1882.

The Scrub Oak mine at Mine Hill, near Dover, will unquestionably break all previous records for output with an indicated production of about 700,000 tons. This is low-grade ore, analyzing less than 30 per cent iron before concentration, but it has the virtue of being low in sulphur and phosphorus also, and hence is highly desirable for the manufacture of iron having the same good qualities. By a milling process the iron content of the ore is raised to approximately 67 per cent before shipment, thus changing it to one of the richest ores on the market. At the present time the mine is employing about 475 men.

The Mt. Hope mine, only a few miles to the northeast, is also operating at a high rate and production for the year will unquestionably be well over 100,000 tons. This mine employs about 140 and had the record of operating throughout 1938 when many mines were forced to suspend operations temporarily.

The Richard mine, only one and a half miles southwest of the Mt. Hope mine, was closed during the first 10 months of the year, but is now reopened. This mine normally employs about 90 men and produces at the rate of about 10,000 tons a month and it should therefore add several thousand tons to the total State production for 1939.

The fourth active mine, the Washington mine at Oxford, Warren County, was reopened about Oct. 1 and is now employing approximately 100 men on two shifts. Production is being maintained at the rate of about 16,000 tons monthly from the present stopes and plans are being made to reopen the old McKinley ore-body at an early date.

Present activity in the mining industry is reminiscent of similar activity during the World War; but whereas shipments following that war declined

from a peak of 528,084 tons in 1916 to a minimum of 90,374 tons in 1922, it is felt that improvements in mining and milling methods in the last decade will permit the New Jersey mines to continue operations after the present war in what is bound to become a much more competitive market.

First Metal Poured at New Falls Foundry

CLEVELAND—First metal was poured recently at the Newton Falls plant of Ideal Foundry Co., part of the Union Drawn Steel Division of Republic Steel Corp. About 120 men from Beaver Falls, Pa., are now employed and more are coming as reconditioning of the old plant proceeds here.

Chicago Motor Coach Plant Begins Production

CHICAGO—The General American Aerocoach Co., subsidiary of the General American Transportation Co., delivered the first motor coach last week from its new Chicago district plant. Operations were started about 30 days ago in a plant of the Pressed Steel Car Co., where equipment for assembly line production was installed. The plant at present is geared to complete one coach a day. The first coach is of all-welded lightweight construction, with a welded tubular steel frame. The exterior is aluminum alloy, total weight being around 8000 lb. Power is provided by a 95 hp. Ford Mercury engine located at the rear of the coach.

Texas College Plans Welding Conference

AFULL program of papers together with equipment exhibits and demonstrations has been planned by the mechanical engineering department of the Texas Technological College, Lubbock, Texas, for its fourth biennial welding conference, to be held Feb. 2-3, 1940.

Papers at the first session include: "Oxy-Acetylene Equipment as a Maintenance Tool," by L. D. Sugg, Magnolia Airco Gas Products Co., Houston, and "Arc Welding In Modern Industry," by W. J. Chaffee, Hobart

Brothers Co., Troy, Ohio. A.S.M.E. code requirements for fusion welding of boilers and unfired pressure vessels will be discussed by A. R. Keiler at the afternoon session. At the banquet in the evening, E. W. P. Smith, Lincoln Electric Co., Cleveland, will address the conference on "Cost Reduction of Welded Products."

Papers at the Feb. 3 session include: "Welding for Profit," by R. K. Hughes, Linde Air Products Co., Tulsa, Okla.; "A Reading Course in Welding and Metallurgy," by L. C. Monroe; and "A-C Arc Welding," by N. M. Voorhies, General Electric Co., Dallas. J. C. Hardgrave, Texas Technological College, is in charge of arrangements.

Apprentice Contest Sponsored by A.F.A.

APATTERN making and molding contest for apprentices will be held in 1940 by the American Foundrymen's Association, in conjunction with the association's annual meeting on May 6 to 10. Rules call for local group and plant competitions, which may be conducted by any plant or group of plants employing certified apprentices, to select entries for the national judging. The judging of the winners of the local contests will be done at the annual meeting in Chicago by a committee consisting of S. M. Brah, International Correspondence Schools, F. Cech and J. G. Goldie, Cleveland Trade School, H. L. Charlson, American Steel Foundries, J. M. Johnson, Tri-City Manufacturers' Association, and B. B. Whittfoht, Caterpillar Tractor Co. There will be four classifications, iron molding, steel molding, non-ferrous molding and pattern making, and first, second and third prizes will be awarded in each category.

Further details of the contest, which attracted entrants from 150 foundries in the 1939 competition, may be obtained from the association's offices at 222 West Adams Street, Chicago.

United to Build Bar Mill for Rustless

PITTSBURGH—United Engineering & Foundry Co. has booked an order from the Rustless Iron & Steel Corp., Baltimore, for a bar mill for their new plant now being constructed. Both the present and new plant will be used exclusively for the manufacture of stainless steel products.

... OBITUARY ...

WILLIAM W. HEARNE, Philadelphia ore merchant, died of heart attack on Dec. 18, at the age of 81. Mr. Hearne was born in Chillicothe, Ohio, in 1859, and graduated from Kenyon College, Gambier, Ohio, in 1883. He became associated with the Mathew Addy Co. of Cincinnati in 1891, and acted as Eastern representative of the firm until 1925, when he formed his own organization, W. W. Hearne Co., in Philadelphia to sell ore, pig iron and coke. For the past 30 years he was American representative of Fergusson Wild Co., Ltd., London, and was associated with the F. W. Marshall Co., Philadelphia, for the past nine years. Mr. Hearne served as president of the old Princess Furnace Co. from 1906 until its dissolution. The F. W. Marshall Co. will take over Mr. Hearne's business.

♦ ♦ ♦

MEYER J. FRANKLIN, 62 years old, president of the Franklin Iron & Metal Co., founder of the Franklin Brass Co. and the Franklin-Bishop Coal Co., was buried at Battle Creek, Mich. on Dec. 19. He came to the United States as a 12-year-old Russian immigrant.

♦ ♦ ♦

HENRY L. WRATTEN, 79, a founder and president of the Racine (Wis.) Boiler & Tank Co., died Dec. 19 at a Racine hospital following a brief illness. Widely known in the boiler industry, Mr. Wratten from 1883 to 1913 was superintendent of the S. Freeman & Sons Mfg. Co.

♦ ♦ ♦

JAMES J. DOYLE, superintendent of the Peter Gray Corp., Cambridge, Mass., plant, died at his home in Milton, Mass., Dec. 20. He was 71 years old, and had been connected with the company for many years.

♦ ♦ ♦

WILLIAM U. FOLLANSBEE, former chairman of the board, Follansbee Brothers Co., Pittsburgh, and a pioneer in Pittsburgh industries, died Dec. 19 in his home in Pittsburgh. He would have been 80 years old last week.

Mr. Follansbee started work as an office boy for the Rosedale Foundry. He later entered the employ of the Park-Scott Co. In 1894 this company was taken over by Mr. Follansbee and his three brothers and became the Follansbee Brothers Co. Mr. Follansbee was a member of the American Iron and Steel Institute.

JOHN P. BEAL, president of F. H. Crawford & Co., and of the Beal & Bennett Machine Co., New York, died at Mountinside Hospital in Montclair, N. J., on Dec. 20, aged 53 years. He was formerly identified with the American Bridge Co. and the American Steel Export Co., from which he resigned as secretary-treasurer in 1923 to become president of F. H. Crawford & Co.

♦ ♦ ♦

GUSTAV A. KOSCHIN, founder and president of the Koschin Co., which designs and builds special electrical machinery in Milwaukee, died in his home Dec. 15 as the result of a heart attack. He was 65 years old. He was born in Cologne, Germany, and after serving his apprenticeship there, went to Milwaukee in 1892 and for 17 years was employed by the Pawling & Harnischfeger Co. as a machinist and later as a foreman. He then became head of the electrical department of Horlick Malted Milk Co. at Racine. In 1923 he returned to Milwaukee and established his own company.

♦ ♦ ♦

DON P. O'KEEFE, purchasing agent of the Chevrolet division, General Motors Corp., died Monday, Dec. 18 at the age of 57 after a long illness. Mr. O'Keefe was born in Flint, Mich., in 1882 and was a graduate of the University of Notre Dame. From 1898 until 1906 he was employed by the R. M. Kellogg Co. in Three Rivers, Mich. He then went to Flint as a Buick Motor Co. clerk. He became assistant purchasing agent at Buick in 1908. In 1926 he went to New York as purchasing agent of the Chevrolet Motor Co. and became head of his department when the company's main offices were transferred to Detroit a few years later. During those years he was closely associated with William S. Knudsen, now GM president, when Knudsen was president of Chevrolet.

♦ ♦ ♦

JOHNSTON STUART, a senior partner in the Stuart Foundry Co. from 1893 until 1917, when he retired, died Dec. 15 at Walkerville, Ont. He was born in Detroit 79 years ago.

♦ ♦ ♦

FRED W. SUSSEX, 67 years old, long identified with the automobile industry, died Dec. 13. Mr. Sussex was at one time associated with W. C. Durant in Flint, Detroit and Lansing. He was the sixth man to enter the employ of the Cadillac Motor Co. and had received many honors for his engineer-

ing contributions to the industry. Mr. Sussex retired when the Lansing Durant plant closed.

♦ ♦ ♦

J. E. FRANTZ, since 1925 president of the Landis Tool Co., Waynesboro, Pa., died on Dec. 16 after a long illness. He was 72 years old. He had been identified with the company and its predecessor Landis Brothers, since 1890. He was made general manager in 1906 and president in 1925.

♦ ♦ ♦

FREDERIC K. KNOWLTON, vice-president of the M. D. Knowlton Mfg. Co. and of the Auburn Ball Bearing Co., Auburn, N. Y., died in New York on Dec. 15, aged 60 years.

♦ ♦ ♦

DAVID H. COHEN, head of D. H. Cohen & Co., scrap iron dealers, St. Louis, died at the Jewish Hospital there on Dec. 19, aged 56 years.

Johnson & Johnson to Make Gas Masks for U. S.

CHICAGO—Johnson & Johnson, New Brunswick, N. J., manufacturers of surgical goods, will construct a building covering 65,000 sq. ft. of floor space to make gas masks for the Government. The contract, which is of the educational order type, includes a Federal grant for the installation of special equipment. Operations probably will be started in the fall of 1940. Employment on this project will not be large, since the company merely has to satisfy the Government of its ability to make satisfactory gas masks on a production basis. The plant will be redesigned, however, to accommodate 2400 workers in a three shift day in times of emergency. Equipment to be installed after completion of the building in the spring consists mainly of sewing machines and die cutting machinery. Sewing and assembly are the chief operations. Conveying and drying equipment also will be needed.

"Corronized" Steel Sheets Scheduled for Early 1940

PITTSBURGH—According to W. F. Rockwell, chairman, Standard Steel Spring Co., Coraopolis, Pa., "corronized" steel sheets will be produced by some steel companies early in 1940.

Van Keuren Co., Watertown, Mass., manufacturer of precision measuring tools, has moved into a new plant at 176 Waltham Street, Watertown.

... THE NEWS IN BRIEF ...

Automobile output in 1939 estimated at 3,720,000 cars and trucks in United States and Canada, tenth best year for industry.—Page 36.

New "Cast Metal Handbook" published by the American Foundrymen's Association ready for distribution.—Page 39.

A. S. T. E. annual meeting to be held in New York, March 7, 8 and 9.—Page 39.

Transcript of the testimony of Labor Board Secretary Witt regarding Inland Steel case.—Page 40.

Big shake-up in National Labor Relations Board predicted as result of investigations by Smith committee. . . . Secretary Witt admits conferring with SWOC officials before complaint was filed against Inland Steel Co.—Page 43.

James Gleason awarded A. S. M. E. Gold Medal for distinguished services to the automotive industry.—Page 46.

Micromatic Hone Corp. doubles its floor space.—Page 47.

Fabricated structural steel orders in November drop below October total.—Page 47.

Inland Steel Co. reports growing production of Ledloy in Europe.—Page 47.

Steel companies which are fighting Walsh-Healey Act are granted extension to Jan. 23.—Page 50.

NLRB orders collective bargaining elections in several metal-working plants.—Page 50.

Widespread importance is attached to the work of the Smith committee

in bringing to light maladministration by Labor Board.—Page 50A.

\$4 charge allowed by I. C. C. for transferring scrap from improperly loaded cars.—Page 50B.

Copper "tax" will not be cut in trade agreement with Chile, Department of State announces.—Page 50B.

Tin contracts placed by Procurement Division total 6,560,000 lb.—Page 50B.

U. S. Treasury permits company to charge off cost of tools as indirect factory expense during period of contract performance.—Page 50C.

Navy awards additional airplane contracts. \$20,000,000 contract to Consolidated Aircraft Corp.—Page 50C.

Wage-hour enforcement to be tightened and criminal prosecutions are threatened for falsification of records.—Page 50C.

Westinghouse Airbrake Co. gets orders from Chile for air brakes costing \$264,321.—Page 50C.

Swedish steel industry considers a pooling scheme to control steel prices.—Page 50C.

Luxemburg steel industry experiencing a boom, with large export orders.—Page 50D.

Manganese ore bids received from both foreign and domestic sources by Procurement Division.—Page 50D.

Government contracts for iron and steel products, non-ferrous metals and machinery.—Page 50D.

1939 steel ingot output comes close to the total for 1937. Walter S. Tower, secretary of American Iron and Steel Institute, reviews the year.—Page 50E.

Jones & Laughlin Steel Corp. gives \$25,000 in back pay to 23 employees in settlement of dispute with SWOC.—Page 50F.

Texas Technological College plans 4th biennial welding conference, Feb. 2-3 at Lubbock, Tex.—Page 50G.

United Engineering & Foundry to build bar mill for Rustless Iron & Steel Corp.—Page 50G.

New Jersey iron mines are producing more ore this year.—Page 50G.

General American Aerocoach Co.'s new Chicago plant delivers its first motor coach.—Page 50G.

First metal is poured at Ideal Foundry Co.'s plant at Newton Falls, Ohio.—Page 50G.

American Foundrymen's Association sponsors apprentice contest.—Page 50G.

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Empire Air Training Plan To Cost \$600,000,000

OTTAWA—Prime Minister W. L. Mackenzie King has announced details of the British Empire air training plan, which is expected to become Canada's major contribution to the war. The agreement is called the British Commonwealth Air Training Plan, with Great Britain, Canada, Australia and New Zealand participating, while Canada will be the main contributor both in men and money. It is estimated the total cost over the next three years will be \$600,000,000, of which Canada will pay \$350,000,000. While the agreement runs to March 31, 1943, it may be extended or terminated by mutual agreement. Full speed ahead already has been ordered with the object of making Canada one of the greatest air training centers of the world, the Prime Minister stated. With the money already being spent on other services, Canada's war contribution for the first year is costing \$1,000,000 a day. He stated 67 training schools will be established in the Dominion.

Prime Minister King stated that the Canadian Government did not wait for the agreement to be signed to get started on initial work. Engineers of the Provincial Departments of Highways have surveyed the 60 new flying fields to be established in Canada, and work has started on the enlarging of 20 of the existing fields. While the air training plan has been modified in some details, it is still of such magnitude as to tax Canada's resources to the utmost, and in its present form has received the unanimous approval of Great Britain, New Zealand, Australia and Canada.

Great Britain will supply the bulk of the aircraft, engines and spares as her share of the cost. The scheme will get under way steadily, and up to next September the cost will be about \$90,000,000, of which Canada will contribute \$48,000,000.

♦ ♦ ♦

Industrial Expansion

R. L. GIBSON, president of the R. Cub Aircraft Corp., Hamilton, Ont., stated that the by-law for increase in capital stock of the company has been approved and new capital will be raised for plant extension. An immediate addition will be made to the Hamilton plant.

B. F. Goodrich Rubber Co. of Canada, Ltd., will spend \$85,000 on addition to plant at Kitchener, Ont., G. W. Swan, vice-president, announced.

The two main buildings housing the plate shop and carpenter shop at the Montreal plant of Montreal Dry Dock Co., subsidiary of Canadian Vickers, Ltd., were destroyed by fire with loss of \$50,000. Company will rebuild.

Pocahontas Products Corp. Buys Riddlesburg Furnace

THE Riddlesburg, Pa., furnace of the Colonial Iron Co. has been purchased by the Pocahontas Products Corp., Charleston, W. Va., from the Reconstruction Finance Corp. and will be put into blast shortly after the first of the year by the new owners.

Ore from mines in Pocahontas County, W. Va., owned by the Pocahontas Products Corp., and coke produced from coal from the Broad Top Mine at Riddlesburg, will be used to produce basic and foundry grades of pig iron. The bulk of the ore, which is from a comparatively new bed, has an analysis somewhat similar to Southern ores, but in one section of the bed the material runs into the hematite classification. In the foundry grades of iron produced from this ore it is expected that the phosphorus will run between 0.04 and 0.05 per cent and the sulphur between 0.02 and 0.03 per cent.

The blast furnace will be operated by Pocahontas Iron & Coal Corp., a subsidiary of Pocahontas Products Corp., with executive headquarters at 295 Broadway, New York. Branch sales offices will be established at Marlinton and Charleston, W. Va. Officers of the operating company are Horace V. Tunvene, president; M. W. Stoller-mah, executive vice-president; A. V. Hunter, secretary; Frank Meadows, treasurer, and Rush Meadows, chief engineer. The furnace has a rating of 72,000 tons a year and approximately 400 men will be employed operating it.

Kearney & Trecker Corp. Enlarging Its Plant

MILWAUKEE — Kearney & Trecker Corp. is erecting a new 200x300 ft. addition to its plant which is being modernized for straightline production. The addition is of steel, concrete, brick and glass construction, with a sawtooth roof. A series of bays on one side will have flat roofs. The old plant comprises about 225,000 sq. ft.

REINFORCING STEEL

... Awards of 5900 tons; 8475 tons in new projects

ATLANTIC STATES AWARDS

- 530 Tons, Philadelphia, engine and laboratory building, for Navy Department to Republic Steel Corp., Cleveland.
- 390 Tons, Rego Park, N. Y., Forest Hills High School, to Isteg Steel Corp.; Petay & Fuhrman, contractors.

SOUTH AND CENTRAL

- 1000 Tons, Woodward, Okla., outlet works, U. S. Engineers, to Colorado Fuel & Iron Co., Denver, through Capitol Steel Works.
- 280 Tons, Zanesville, Ohio, Pershing Road housing project, to Truscon Steel Co., Youngstown, through Paul & Adams Bros., contractors.
- 250 Tons, Louisville, Ky., Procurement Invitation 25719, U. S. Treasury, to Youngstown Sheet & Tube Co., Youngstown.
- 200 Tons, Chicago, grain elevator for Glidden Co., to Truscon Steel Co., Youngstown, MacDonald Engineering Co., contractor.

WESTERN STATES

- 1250 Tons, Los Angeles, Sears-Roebuck store, to Blue Diamond Corp., Los Angeles, correct previous item reporting 900 Tons for project to Consolidated Steel Corp., Los Angeles.
- 575 Tons, Earp, Cal., (Invitation 44412-A), to Columbia Steel Co., San Francisco.
- 166 Tons, Leavenworth, Wash., migratory fish control (Invitation B-38064-A), to Sheffield Steel Co., Kansas City, Mo.
- 115 Tons, Burns, Ore., postoffice to Kyle & Co., Los Angeles, through L. F. Dow Co., Los Angeles, contractor.
- 100 Tons, Fresno County, Cal., highway grading, to Gilmore Fabricators, Inc., San Francisco; through A. Teichert & Son, Sacramento, Cal., contractor.

HAWAII

- 2100 Tons, Pearl Harbor, T. H., specification 9100, two graving docks for Navy Department, to Hawaiian Dredging Co. Ltd. and Pacific Bridge Co., San Francisco, on joint bid.

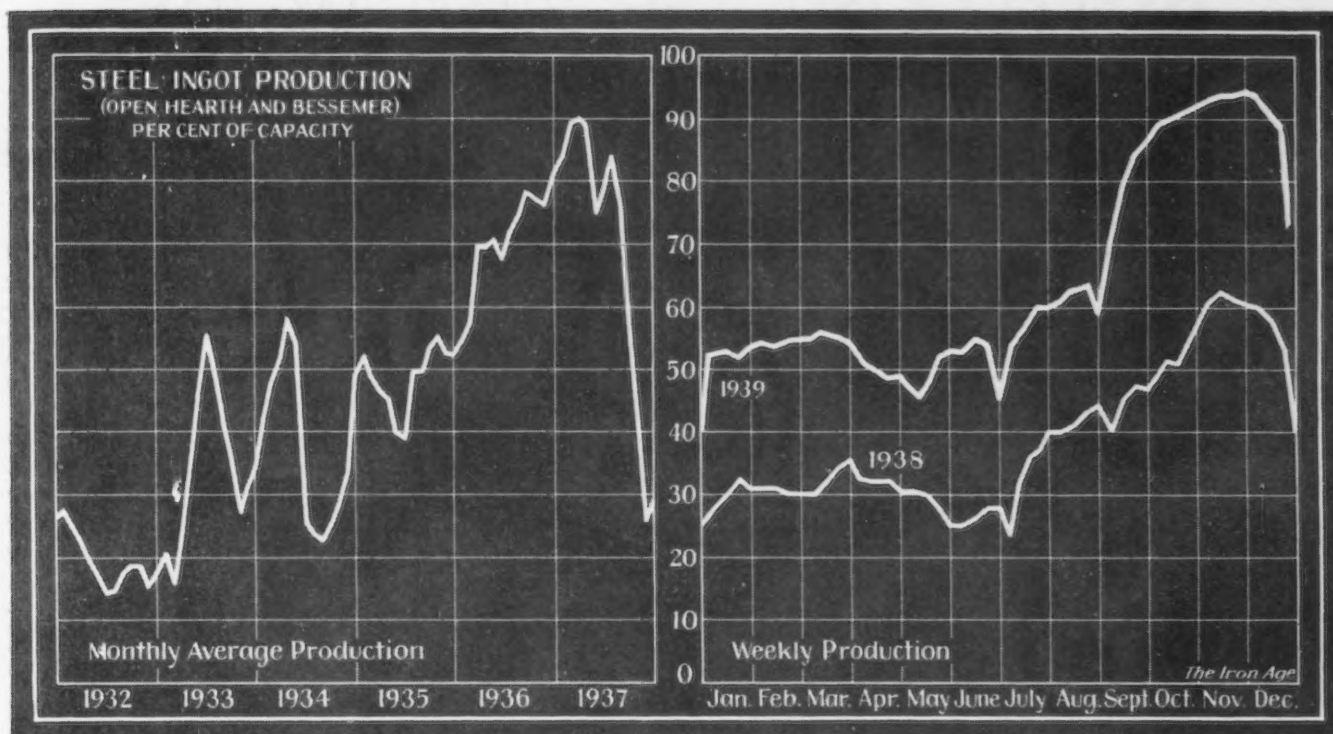
PENDING REINFORCING BAR PROJECTS ATLANTIC STATES

- 2800 Tons, Pittsburgh, Terrace Village housing project; Hunkin-Conkey Co., low bidder on general contract.
- 1000 Tons, Newark, N. J., James M. Baxter housing project; bids Dec. 21.
- 750 Tons, Wilkes-Barre, Pa., Toby Creek outlet works and pumping station.
- 700 Tons, Brooklyn, Coney Island sewage plant; bids Jan. 4.
- 500 Tons, Atlantic City, N. J., housing project; John McShain, Inc., Philadelphia, low bidder.
- 450 Tons, Prince George County, Md., gas holder.
- 400 Tons, South Norwalk, Conn., housing project.
- 390 Tons, Somerset County, Pa., Allegheny Mountain tunnel ventilation building.
- 369 Tons, Baltimore, Indian Rock Dam, U. S. Engineers, Susquehanna River flood control; Benjamin Foster, Philadelphia, low bidder on general contract.
- 200 Tons, Antietam, Md., grade elimination, contract W-312-1-643; bids Dec. 28.

SOUTH AND CENTRAL

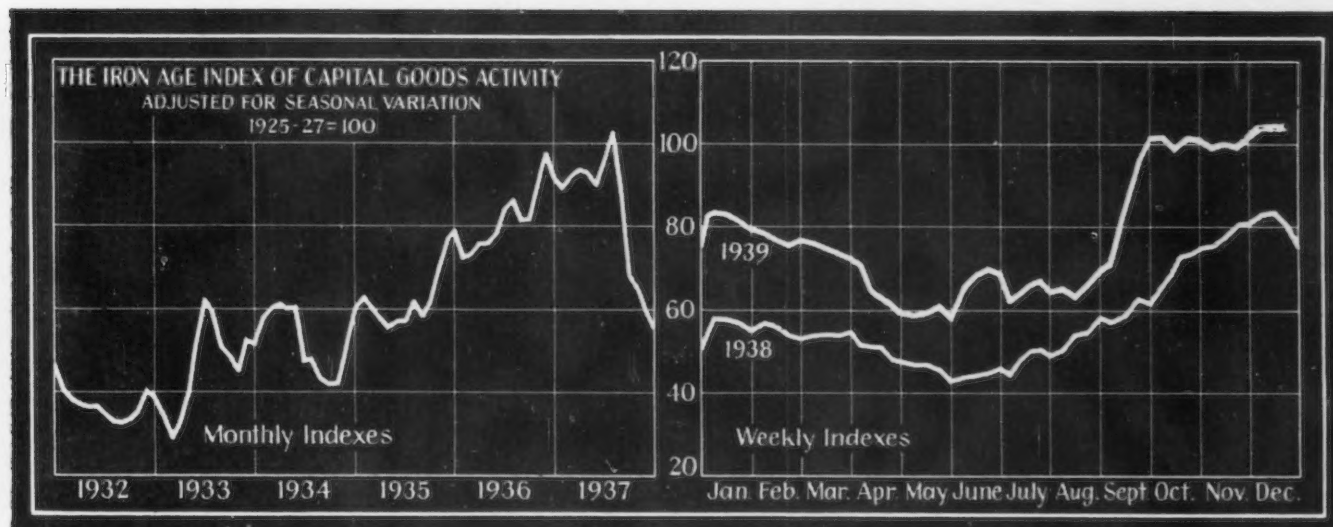
- 190 Tons, Lima, Ohio, State project; bids Dec. 29. (Also 50 tons of structural steel).
- 160 Tons, Quincy, Ill., sewage treatment plant.
- 140 Tons, Woodward, Okla., bridge.
- 130 Tons, Waterloo, Iowa, Roth Packing Co.
- 112 Tons, Rantoul, Ill., air corps hanger and school.
- 100 Tons, Milford, Ohio, State project; bids Dec. 30.
- 100 Tons, Bowling Green and Hopewell, Ohio, State projects; bids Dec. 29.
- Unstated tonnage, Champaign, Ill., power station, University of Illinois.
- 124 Tons, Clyde, Cal., Central Valley Project (Invitation 49085-A); bids in.
- 103 Tons, Alameda, Cal., Navy Base, public works shop and other buildings (Specification 8618); Peter Sartorio, San Francisco, contractor.

Holiday Drops Ingot Rate 15½ Points to 74%



District Ingot Production, Per Cent of Capacity	Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern	S. Ohio	Western	St. Louis	Eastern	Aggregate
CURRENT WEEK..	71.0	79.5	66.0	70.0	67.0	67.0	71.0	83.5	75.0	66.0	75.0	66.5	99.0	74.0
PREVIOUS WEEK..	89.0	92.0	88.0	89.0	88.0	85.0	81.0	95.5	86.0	42.0	90.0	80.0	95.0	89.5

Year-End Influences Depress Capital Goods Index



THE approach of the year-end and the accompanying slackening of industrial operations for the holidays and inventory taking caused THE IRON AGE capital goods index for the week ended Dec. 23 to decline 0.8 point to 104.8. The week's loss was considerably less than in the comparable week of 1938 when the index dropped 2.2 points, and in 1929 when it declined 11.8 points. The steel, heavy construction and Pittsburgh factors were all lower in the week, both before and after adjustment for seasonal trend, while the automobile and lumber carloading components both were higher after correction for seasonal trend. Actually all the industries represented in the index showed reduced output in the week, but in the case of automobile assemblies and lumber carloadings, the decrease was less than seasonal, causing the adjusted figures for these two components to rise slightly. The present

position of the combined index is 0.8 point below the year's high and 1.2 points below the 1937 peak.

	Week Ended Dec. 23	Week Ended Dec. 17	Comparable Week	
			1939	1929
Steel ingot production ¹	130.7	133.5	86.3	57.5
Automobile production ²	117.8	116.8*	96.5	43.4
Construction contracts ³	81.8	82.8	89.0	93.2
Forest products carloadings ⁴	75.6	75.0	66.6	106.6
Production and shipments, Pittsburgh District ⁵	118.0	120.0	67.9	101.1
Combined index	104.8	105.6*	81.3	80.4

*Revised.

Sources: ¹THE IRON AGE; ²Ward's Automotive Reports; ³Engineering News-Record; ⁴Association of American Railroads; ⁵University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ending Dec. 17. Other indexes cover the week of Dec. 23.

SUMMARY OF THE WEEK . . .

... Holiday week brings production decline; rebound expected next week.

o o o

... Outlook for January promising, though rate may be below that of fourth quarter.

o o o

... Steel scrap ignores favorable factors; composite drops to \$17.67.

INFLUENCED mainly by holiday shutdowns, steel ingot production has declined this week to 74 per cent, but will rebound next week to approximately last week's rate of 89½ per cent. A full week's production will be had next week as New Year's Day is not a steel mill holiday.

Meanwhile, pig iron production is holding at a high level, having been augmented by the blowing in of Inland Steel Co.'s No. 1 blast furnace, which has been rebuilt.

Except for tin plate, which is in a seasonal decline, with operations this week at only 68 per cent, partly due to holiday shutdowns, steel products are enjoying a demand which is better than was expected for this time of the year. Sales have tapered off during the past few weeks, but are still at a level that holds considerable promise for the first quarter and particularly for January. One large company making a wide variety of products reports that in the first 21 days of December its sales were equal to 80 per cent of its capacity. Some other companies have not done quite so well, new orders being generally fairly well below the volume of shipments. However, buying on a larger scale is expected by mid-January.

At the beginning of the new year most makers of sheets and strip have fairly large backlogs extending through the first quarter. Some of these are carry-over business which could not be completed in this quarter. Makers of hot rolled bars and wire rods are in much the same position, but in other products the delivery situation is becoming easier. Plate mills still have substantial backlogs running through three or four months of 1940 for new railroad equipment and repair work. Mills rolling rails and track accessories will not complete for some months the large orders placed since September. Structural steel is in lighter demand; a seasonal condition. Though shipments of fabricated material in November by members of the American Institute of Steel construction were in good volume, new contracts fell off sharply. Week-to-week

awards and inquiries lately have been in reduced aggregate tonnages. Tin plate production may be expected to recover somewhat next week but stocks on hand will be drawn upon until can manufacturing programs for the 1940 packing season get under way about February.

It is not to be expected that the high steel production rate of the fourth quarter will extend into 1940, but present indications are that January output will be not far from 85 per cent of capacity. Whether such a high rate can be continued beyond January will depend on developments that cannot yet be clearly foreseen, foreign trade for example. The present expectation is that operations may slowly recede during the quarter, but will remain high enough for profitable results.

Despite the loss of production at the year-end, steel output in the fourth quarter will be about 16,000,000 gross tons. December output will be about 5,200,000 tons as compared with 5,462,616 tons in November, the all-time record month. The year's total will fall a little under 46,000,000 tons, not including electric and crucible steel.

AUTOMOBILE manufacturers are arranging for first quarter shipments of steel against orders that have been placed at full published prices. While takings of steel by motor car manufacturers will not be as heavy in the first quarter as in the current quarter, it is indicated that shipments will be substantial.

There is still some uncertainty as to whether the railroads will resume their buying programs before equipment orders now on the books are completed a few months hence, but there is an expectation that 25,000 to 30,000 additional freight cars will be ordered if carloadings hold at a profitable level.

Construction activity in 1940 is expected to reach 1939 levels or slightly higher. Private undertakings will make up for some loss in Government-financed projects.

General consumer demand cannot be accurately gaged until new year developments have brought a clearer picture, but at the moment there is no evidence of a sharp falling off. Satisfactory holiday trade has indicated greater consumer spending power.

THE presence of favorable indications for at least the early part of 1940 has not yet been reflected in scrap price movements. Scrap prices are weaker in several centers and THE IRON AGE composite has declined for the eighth consecutive week. This week's drop is 16c. to \$17.67. The holding up of scrap shipments by some of the mills has tended to add to the weakness of the market.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

	Dec. 26, 1939	Dec. 18, 1939	Nov. 28, 1939	Dec. 27, *1938
<i>Per Gross Ton:</i>				
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$40.00
Light rails: Pittsburgh, Chi- cago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Bir- mingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chi- cago, Cleveland, Youngs- town, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngs- town, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Bir- mingham	40.00	40.00	40.00	40.00
Wire rods: No. 5 to 9/32 in., Pittsburgh, Chicago, Cleve- land, per lb.	2.00	2.00	1.92	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

<i>Cents Per Lb.:</i>				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Spar- rows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham ..	2.10	2.10	2.10	2.10
Alloy bars: Pittsburgh, Buf- falo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Cold finished bars: Pitts- burgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.10	2.10	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown ...	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pitts- burgh, Gary Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham..	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown..	2.10	2.10	2.10	2.15
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown ...	3.05	3.05	3.05	3.20

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

Dec. 26, 1939
One week ago
One month ago
One year ago

2.261c. a Lb.
2.261
2.261
2.286

Based on steel bars, beams,
tank plates, wire, rails, black
pipe, sheets and hot-rolled strip.
These products represent 85 per
cent of the United States output.

	HIGH	LOW
1939.....	2.286c., Jan. 3	2.236c., May 16
1938.....	2.512c., May 17	2.211c., Oct. 18
1937.....	2.512c., Mar. 9	2.249c., Jan. 4
1936.....	2.249c., Dec. 28	2.016c., Mar. 10
1935.....	2.062c., Oct. 1	2.056c., Jan. 8
1934.....	2.118c., Apr. 24	1.945c., Jan. 2
1933.....	1.953c., Oct. 3	1.792c., May 2
1932.....	1.915c., Sept. 6	1.870c., Mar. 15
1931.....	1.981c., Jan. 13	1.883c., Dec. 29
1930.....	2.192c., Jan. 7	1.962c., Dec. 9
1929.....	2.236c., May 28	2.192c., Oct. 29
1928.....	2.192c., Dec. 11	2.131c., Jan. 3

Cents Per Lb.:

	Dec. 26, 1939	Dec. 18, 1939	Nov. 28, 1939	Dec. 27, *1938
Wire nails: Pittsburgh, Chi- cago, Cleveland, Birming- ham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chi- cago, Cleveland, Birming- ham	2.60	2.60	2.60	2.60
Barbed wire, galv.: Pitts- burgh, Chicago, Cleveland, Birmingham	†3.40	3.40	3.40	3.20
Tin plate, 100 lb. base box: Pittsburgh and Gary	\$5.00	\$5.00	\$5.00	†\$5.00

*Pittsburgh prices only.

†Applies to 80-rod spools only.

‡Subject to post-season adjustment.

Pig Iron

Per Gross Ton:

No. 2 fdy., Philadelphia	\$24.84	\$24.84	\$24.84	\$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago† ...	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd car- lots	100.00	100.00	100.00	92.50

†The switching charge for delivery to foundries in the Chi-
cago district is 60c. per ton.

Scrap

Per Gross Ton:

Heavy melting steel, P'gh...	\$18.25	\$18.25	\$18.75	\$15.75
Heavy melting steel, Phila...	18.50	18.75	19.75	15.25
Heavy melting steel, Ch'go...	16.25	16.50	17.25	13.75
Carwheels, Chicago	15.75	16.00	16.50	12.50
Carwheels, Philadelphia	20.25	20.25	21.25	16.75
No. 1 cast, Pittsburgh	19.25	19.25	19.75	15.50
No. 1 cast, Philadelphia	20.75	20.75	21.75	16.75
No. 1 cast, Ch'go (net ton) ..	14.25	14.50	15.00	12.50

Coke, Connellsville

Per Net Ton at Oven:

Furnace coke, prompt	\$5.00	\$5.00	\$5.00	\$3.75
Foundry coke, prompt	5.75	5.75	5.75	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:

Copper, Electrolytic, Conn...	12.50	12.50	12.50	11.25
Copper, Lake, New York ...	12.50	12.50	12.50	11.375
Tin (Strait), New York ...	50.25	51.00	54.50	46.50
Zinc, East St. Louis	6.00	6.00	6.50	4.50
Zinc, New York	6.39	6.39	6.89	4.89
Lead, St. Louis	5.35	5.35	5.35	4.70
Lead, New York	5.50	5.50	5.50	4.85
Antimony (Asiatic), N. Y...	16.50	16.50	16.50	14.00

Pig Iron

\$22.61 a Gross Ton
22.61
22.61
20.61

Based on average for basic
iron at Valley furnace and found-
ry iron at Chicago, Philadel-
phia, Buffalo, Valley and South-
ern iron at Cincinnati.

	HIGH	LOW
\$22.61, Sept. 19	\$20.61, Sept. 12	
23.25, June 21	19.61, July 6	
23.25, Mar. 9	20.25, Feb. 16	
19.73, Nov. 24	18.73, Aug. 11	
18.84, Nov. 5	17.83, May 14	
17.90, May 1	16.90, Jan. 27	
16.90, Dec. 5	13.56, Jan. 3	
14.81, Jan. 5	13.56, Dec. 6	
15.90, Jan. 6	14.79, Dec. 15	
18.21, Jan. 7	15.90, Dec. 16	
18.71, May 14	18.21, Dec. 17	
18.59, Nov. 27	17.04, July 24	

Steel Scrap

\$17.67 a Gross Ton
17.83
18.58
14.92

Based on No. 1 heavy melting
steel quotations at Pittsburgh,
Philadelphia and Chicago.

	HIGH	LOW
\$22.50, Oct. 3	\$14.08, May 16	
15.00, Nov. 22	11.00, June 7	
21.92, Mar. 30	12.92, Nov. 10	
17.75, Dec. 21	12.67, June 9	
13.42, Dec. 10	10.33, Apr. 29	
13.00, Mar. 13	9.50, Sept. 25	
12.25, Aug. 8	6.75, Jan. 3	
8.50, Jan. 12	6.43, July 5	
11.33, Jan. 6	8.50, Dec. 29	
15.00, Feb. 18	11.25, Dec. 9	
17.58, Jan. 29	14.08, Dec. 3	
16.50, Dec. 31	13.08, July 9	

... THIS WEEK'S MARKET NEWS ...

STEEL OPERATIONS

... Holiday shutdowns bring rate for week down to 74%

CHRISTMAS holiday shutdowns have reduced steel ingot operations for the current calendar week to 74 per cent from 89½ per cent last week. After making allowance for the time taken out for the holiday, the industry as a whole is operating at approximately last week's rate.

Ingot operations at PITTSBURGH are estimated at 71 per cent of capacity, down 18 points from a week ago. A quick rebound is expected next week. WHEELING-WEIRTON district is off 10 points to 71 per cent.

CHICAGO district mills are operating at 79½ per cent of capacity, a decrease of 12½ points from last week. Next week's rate is expected to approximate the 92 per cent of a week ago. The Inland Steel Co.'s No. 1 blast furnace, which was just rebuilt, was blown in Tuesday, all five of that company's stacks now making iron. The CHICAGO district now has 31 of 38 stacks in blast.

Christmas shutdowns have forced the CLEVELAND-LORAIN weekly ingot average down 21 points to 67 per cent, while the weekly average for YOUNGSTOWN and nearby cities is down 22 points to 66 per cent. At most plants the tapping of open hearths was resumed late Monday and by late Tuesday output was close to the levels prevailing before the holiday. The one-day shutdowns permitted badly needed minor repairs at practically all plants. At the Upson works of Republic Steel Corp., Cleveland, the 34-in. blooming mill is being dismantled for export.

With repairs on the slabbing mill at the Middletown unit of the American Rolling Mill Co. completed, steel production in the SOUTHERN OHIO district rebounded sharply this week to an average of 66 per cent. Seven of eight open hearths are in operation at Middletown and full operation following the holiday is reported at the Ashland unit. Currently, there are 23 out of 33 open hearths in operation.

Eastern Pennsylvania steel making operations this week are estimated at

70 per cent of capacity, as compared with 89 per cent a week ago. Two district producers have taken off one open hearth each.

Other districts have shown losses which in virtually all cases are due to the holiday.

NEW BUSINESS

... Orders are lighter but holiday lull is less than expected

STEEL orders at PITTSBURGH in the past week declined moderately owing to year-end inventory and Christmas holiday factors. This condition is expected to prevail during the remainder of this week. Probably no discernible new trend can be noted for at least two weeks. Products least affected by the drop in aggregate business have been wire rods, hot rolled bars, and semi-finished steel.

Shipments in the past week at PITTSBURGH have remained relatively high and consequently a further small drop has occurred in unshipped tonnage volume. On a daily basis, incoming steel business during the past week was substantial enough to support an operating rate somewhere between 60 to 65 per cent of capacity but it is not expected that total sales in the next week would support as high a rate.

Little change is noticeable in the rate at which new business is being received this week by CHICAGO sales offices. One large mill reports bookings equal to nearly 80 per cent of capacity for the first 21 days of December. Though this same mill earlier predicted 50 per cent of capacity bookings at year's end, it now appears that this prophecy was ultra-conservative, as sales officials generally believe the low point will be reached this week or next, and that an upward move again will be seen after Jan. 1.

Cancellations because of top-heavy inventories or slackening production at consumers' plants are not as yet important in CHICAGO. Such cancellations as there have, almost without exception, been replaced on mill schedules with changed specifications, the fault being in ordering so far in advance that exact needs were not known at the time. Pressure for ship-

ments is still strong from many sides.

The railroad car building industry offers a bright picture, with nearly 30,000 cars on order, and an additional 25,000 or 30,000 cars likely to be ordered early in 1940. Most of the steel for those cars already ordered is scheduled for first quarter rolling and shipment. The automobile industry also has much activity ahead, but some reports have been heard that previous estimates indicating capacity operations of five days a week through the first quarter are a little strong, and that some plants may be down to four days weekly in a short time.

Shipments of CLEVELAND and YOUNGSTOWN mills at midweek had recovered quickly from the Christmas holiday disruption. Only a relatively small number of consumers requested delivery holdups until after their inventory taking period, a development which proved surprising and gratifying to sellers. From all indications at CLEVELAND and YOUNGSTOWN, early first quarter activity will be brisk on the part of both steel producers and consumers. While some lines cannot expect maintenance of fourth-quarter levels, gradual declines rather than sharp breaks are predicted.

The volume of new business being booked in PHILADELPHIA continues to decline. The past week's volume in several district offices was the year's low point. Consumption is still maintained at a relatively high pace, but the combination of the year end and the freer delivery situation is keeping new buying at a minimum. Delivery periods have been shortening more rapidly than had been expected and in several cases district consumers have received material originally scheduled for late January shipment. Merchant bars are being offered for shipment in three to four weeks and plates for delivery as quickly as one week. The sheet backlog, however, is still fairly heavy and delivery of new orders is not being promised before the middle of February.

SAN FRANCISCO's port is still closed, seriously hindering steel movements. With several large projects pending, activity is brisk, however. Especially noticeable is the increasing number of private projects.

PIG IRON

... Shipments in December below those of November

HOLIDAY influences are hampering shipments of CLEVELAND producers and the month will wind up lower than November on deliveries. Hold-ups have not been as numerous as some sellers expected, however. First quarter buying continues in fair volume but some foundries have quite definitely adopted a conservative attitude and are committing themselves only for definite requirements. Foundry coke deliveries up to the middle of December ran behind those of November and then began picking up, an encouraging development.

December pig iron shipments to date in the CHICAGO district are slightly more than a month ago, but this margin has lessened in the past week, and by the end of the month a small decrease from November is expected. Tonnage on the books is sufficient to last producers through March at capacity shipping rates. About half of this tonnage is understood to be \$21 iron and, though the carryover will probably extend through January, definite shipping schedules are at hand against this material. Considering the size of the backlogs, sales of \$23 iron are regarded as quite satisfactory. Foundry coke is currently about 6 per cent less active than a month ago.

Pig iron sales volume at PITTSBURGH has been off somewhat in the past week owing to seasonal factors. Requirements from non-integrated steel makers, however, were changed but little from the previous week as steel-making departments held shut-downs to a minimum.

Discounting the holiday interruptions, melting operations in PHILADELPHIA are holding close to the November level, with most plants casting five days a week. First quarter contracting is light, with most plants having sufficient iron on order to carry well through January. The export market remains inactive, with only a few small Scandinavian inquiries before the trade.

Holiday influences and shutdowns for inventory purposes at year end tended to cut new business in the New YORK area to a mere trickle last week, and little if any new commitments are expected this week. On the other hand, a few foundries that are shut down all this week have not held up shipment of iron during the inventory period.

Shipments for the month, while materially off from the high November volume, are nevertheless much higher than for December, 1938. Little change in the current slackness is looked for until about the middle of January. Foreign inquiries are in the smallest volume in many months.

The NEW ENGLAND foundry industry comes up to the close of 1939 operating at a higher rate than in years. It has substantial orders on books, even jobbing foundries reporting backlogs. Some of the large consumers have comfortable stocks of iron, but not enough to carry through the first quarter at the current rate of melt. Less important consumers' iron stocks may carry them through January and part of February. It therefore appears that a substantial buying movement will develop in the first quarter and that some material purchases will be consumed in that period.

With an increase in jobbers melt during the past week, CINCINNATI district foundry operations are stepped up to probably about 60 per cent of capacity. Machine tool melters are most active, with the stove industry experiencing a normal seasonal lull.

IRON ORE

... Lake Superior stocks on Dec. 1 were 40,732,096 tons

CONSUMPTION of Lake Superior iron ore during November was 5,477,969 gross tons, exceeding that of any month since August, 1929, according to the report of the Lake Superior Iron Ore Association, Cleveland. Cumulative consumption up to Dec. 1 at 38,822,915 gross tons was well ahead of the 22,662,350 tons used in the corresponding part of 1938. In October consumption totaled 5,270,707 tons and in November, 1938, was 3,150,073 tons.

Iron ore on hand Dec. 1 at furnaces, including tonnages at Eastern plants which are using only a small proportion of lake ore, totaled 35,515,600 tons, while Lake Erie docks held 5,216,496 tons, a total of 40,732,096 tons, against 39,004,657 tons at the end of November and 37,456,325 tons on Dec. 1, 1938.

The association reports 157 blast furnaces depending principally on Lake Superior iron ore were active Nov. 30 compared with 154 on Oct. 31 and only 95 on Nov. 30, 1938.

RAILROAD BUYING

... Equipment manufacturers busy on old orders

ALTHOUGH the lull in railroad buying continues, equipment manufacturers are working at near capacity levels turning out material ordered in the September and October buying wave. Capacity production for the Milwaukee car shops of Chicago, Milwaukee, St. Paul & Pacific is indicated by announcement that work on construction of 2000 more box cars will be started on Jan. 16. Estimated cost of this program is \$5,000,000. These shops are at present completing a previous order for 1188 cars, so there will be no letdown in operations until the new order is completed.

American Car & Foundry Co. has received an order for 100 gondola cars from Lake Terminal and has been authorized by the Interstate Commerce Commission to build five additional fusion-welded tank cars and four riveted aluminum alloy tanks. The latter equipment will be used for experimental service transporting nitric acid. American Car & Foundry Co. also booked six baggage cars from Richmond, Fredericksburg & Potomac.

Chicago, Burlington & Quincy has ordered 10 locomotives from its own shops and the Panama (Canal Zone) Railroad has purchased five locomotives from American Locomotive Co. These five locomotives are in addition to five diesel electrics previously ordered from General Electric Co.

The Interstate Commerce Commission has approved an RFC loan of \$9,300,000 to receivers of the Wabash Railroad, of which sum \$2,800,000 will be used for repairing 1694 40-ton steel underframe automobile box cars in the shops of the railroad at Decatur, Ill.

SEMI-FINISHED STEEL

... Demand still heavy though backlogs are being reduced

THE volume of specifications at PITTSBURGH held up fairly well up to the end of last week but continued under the level of shipments, with the result that backlogs have again been reduced moderately. Because many mills will need their own output of semi-finished steel for sometime, aggregate production is not expected to decline to any marked degree for the next several weeks at least.

At CLEVELAND and YOUNGSTOWN the fourth successive hectic month is drawing to a close for semi-finished departments and the early first quarter holds very little promise of a respite. Despite emergency deliveries of semi-finished from other cities, slack production has been forced upon finishing mills occasionally. The jam on semi-finished has been more severe than at any time in years and brought unprecedented plant emergency movements.

REINFORCING BARS

... Awards total 5900 tons and new jobs 8475 tons

REINFORCING steel awards call for 5900 tons, including 2100 tons for two graving docks at Pearl Harbor, Hawaii, and 1000 tons at Woodward, Okla., for outlet works for U. S. Engineers.

Among new reinforcing steel projects of 8475 tons are 2800 tons for the Terrace Village housing project, Pittsburgh, and 1000 tons for the James M. Baxter housing project at Newark, N. J.

COLD FINISHED BARS

*... Specifications have declined
... Consumers delay deliveries*

SPECIFICATIONS have been declining recently, with a resultant paring down in backlogs. Part of the easing off in orders has been attributable to year-end influences. Some consumers have pushed delivery dates further into 1940. Releases from the automotive industry are holding up fairly well with an increase expected some time in January.

MERCHANT BARS

*... Extended deliveries still rule
... Orders in good volume*

ON a daily basis, hot rolled bar sales at PITTSBURGH have been almost as heavy as a week ago but obviously the weekly sales tonnage has been off due to year-end factors. This condition is expected to be in evidence for the next week or so. Shipments have remained at recent levels, with the result that most mills have been able to pare down backlogs but the decline has not yet been substantial.

Small bar shapes are still subject to extended deliveries.

Deliveries by CHICAGO mills range from 30 days to almost 90 days. No change in the downward trend of specifications is expected until after Jan. 1. In the first quarter good demand will probably be experienced, according to sellers, from makers of agricultural machinery, cold drawers, forgers and railroad car builders.

At CLEVELAND and YOUNGSTOWN the condition surrounding the small merchant bar mills continues to be the controlling factor making for strength. The fact that deliveries are so greatly extended on the small mills even has some influence upon activity of large size mills. It is noteworthy that few holdups have been received due to holiday influences, as usually expected at this time of year. New business has been moderate, of course, since the middle of the month.

STRUCTURAL STEEL

... Lettings 12,100 tons and new projects 9950 tons

STRUCTURAL steel lettings advanced to 12,100 tons from 9300 tons a week ago. Sizable awards include 2560 tons at CLEVELAND for the Lake Road generator station; 1540 tons for a seaplane hangar at Pensacola, Fla.; 1215 tons at CHICAGO for a Cook County bridge section, and 1090 tons for a bridge in Woodward County, Okla.

New structural steel projects are slightly higher at 9950 tons against 7600 tons a week ago and include 1900 tons at Baltimore for a boiler house and precipitator unit for the Consolidated Electric Light & Power Co.; 1800 tons for bulb angle curbing in Brooklyn, and 1540 tons for a bridge between St. Louis and Jefferson Counties, Mo.

Among plate inquiries of 13,600 tons is 12,000 tons for pipe for the Department of Water and Power, Los Angeles.

The Navy Department has awarded the contract for constructing two concrete graving docks at Pearl Harbor, T. H., to Hawaiian Dredging Co. and Pacific Bridge Co., San Francisco, jointly. Material required for the docks themselves is 9000 tons of steel H-type bearing piles, more than 2000 tons of reinforcing steel, 2000 tons of sheet piling and 1600 tons of fabricated structural shapes. In addition, the contractor has made inquiries for

barges requiring about 1200 tons of structural shapes for transporting the material to the islands and a gantry crane requiring about 250 tons for erecting it. Award of this steel is expected momentarily.

The first 1940 call for bids by the Missouri Highway Commission includes a highway bridge requiring 1540 tons. Bids close Jan. 5.

SHEETS AND STRIP

... First quarter backlogs assure continuing good operations

A FURTHER reduction in backlogs has materialized in PITTSBURGH this past week, as shipments remained at a relatively high rate and incoming business declined seasonally. Some moderate sized year-end releases came from the automotive trade and it is expected that new buying from this source will take place before the middle of January. It will take at least two weeks to determine early 1940 sheet and strip buying trends.

Though specifications at CHICAGO sales offices are declining, general opinion regarding the first quarter is optimistic. The automobile industry is expected by CHICAGO mills to be in constant need of flat rolled throughout the period, though sheet and strip production may not be at so high a rate as has been predicted in some quarters. Railroad car builders have approximately 30,000 cars on order, with much of the steel scheduled for first quarter shipment. In addition, sometime after the first of the year, 25,000 or more cars not yet announced may be placed. Cold rolled sheets may be obtained by CHICAGO consumers as early as the third week in January, ranging on up to March. Plain hot rolled sheets are available in 30 days or less. Cold rolled strip is in great demand by tubing manufacturers, but shipment before April by some mills is impossible, with hot rolled strip sharing this situation.

CLEVELAND and YOUNGSTOWN mills are striving to meet the Dec. 31 deadline but there will be a carryover into the new year on deliveries of low priced tonnage. If all the necessary raw steel had been available, fourth quarter production would have been considerably better, but it was necessary to share semi-finished supplies with bar mills, which were also heavily scheduled. In the past week several

good-sized orders for sheets have been received from users who find they underestimated first quarter requirements.

A SOUTHERN OHIO sheet producer reports that it is booked through February, with some orders extending into March on the more popular types of sheets.

... PLATES ...

... Railroad orders are principal backlog for first quarter

MOST of the steel for the 30,000 cars on order by the railroads has been placed, but rolling and shipment will not be until first quarter and later. It is understood that another 25,000 or 30,000 cars may be ordered after Jan. 1. Plates are scheduled by some CHICAGO mills into February on the basis of orders now booked.

At CLEVELAND new business consists almost entirely of current actual requirements. Delivery promises as low as three or four weeks are being made.

The demand in EASTERN PENNSYLVANIA has moderated considerably over the past 10 days, but mill shipments are being maintained at November's high level. This condition is eating up backlogs very rapidly and most of the smaller independent producers in that district will go into the new year with very thin order books. All current business is being done on the 2.10c. Claymont, basis. Export sales are still disappointing, with only a few very small orders for shipment to the Scandinavian countries and South America having been booked

recently at 2.45c., f.a.s., for merchant plates, and 2.55c., f.a.s., for ship plates. There have been, however, several instances lately when this long recognized \$2 differential in merchant and ship plates has been ignored in quoting on foreign business.

Los Angeles Department of Water and Power will take bids Jan. 5 for furnishing approximately 12,000 tons of large diameter welded steel water pipe. Bids on approximately 6000 tons additional are expected to be taken by this agency soon.

WIRE PRODUCTS

... Rod sales are active, but demand for other items declines

WIRE rods sales remained active in the past week and the same held true for certain grades of manufacturers wire at PITTSBURGH. Demand for merchant wire products, however, has suffered a further relapse in the past week but a higher level of business is looked for soon when jobbers begin ordering spring requirements. Meanwhile, mills are busy replenishing depleted stocks.

TIN PLATE

... Operations drop sharply to 68% ... Some shipments deferred

BECAUSE of holiday curtailments, tin plate operations this week are estimated at 68 per cent, off 20 points from a week ago. A rebound is expected next week but the entire loss will probably not be made up, inas-

much as backlogs are being depleted moderately and new specifications have been dropping off in volume. Additional cases of shipments being pushed into January have been noted. Export business remains moderately good.

TUBULAR GOODS

... Backlogs are not large but stocks are depleted

EXCEPT for the few days preceding Christmas shut-downs, the daily volume of pipe business in the past week compared favorably with the preceding week. Oil country goods demand was unchanged but a slight upward trend was noted in standard pipe specifications. Bookings from oil companies are expected to taper off in the next few weeks and remain at comparatively lower levels until 1940 budget figures have been approved. Most mills will utilize any slack period which might occur to build up badly depleted mill stocks.

CLEVELAND and YOUNGSTOWN sellers will enter the new year with modest backlogs. Stocks will be in better shape than at the start of December and all facilities in good shape to meet first quarter requirements.

101-Year-Old Company Dissolved at Youngstown

YOUNGSTOWN—Brier Hill Iron & Coal Co., oldest incorporated industrial concern here, has been dissolved by the Tod, Stambaugh and Butler families. The firm was 101 years old.

Weekly Bookings of Construction Steel

	Week-Ended				Year to Date	
	Dec. 26, 1939	Dec. 18, 1939	Nov. 28, 1939	Dec. 27, 1938	1939	1938
Fabricated structural steel awards	12,100	9,300	25,770	40,800	953,875	963,325
Fabricated plate awards	1,730	0	2,310	5,100	186,585	135,770
Steel sheet piling awards	200	0	0	200	74,765	48,510
Reinforcing bar awards	5,900	8,300	2,380	5,250	454,960	346,985
Total Letting of Construction Steel..	19,930	17,600	30,460	51,350	1,670,185	1,494,590

FABRICATED STEEL

... Lettings advance to 12,100 tons from 9300 tons last week ... New projects slightly higher at 9950 tons as against 7600 tons a week ago ... Plate awards call for 1730 tons.

NORTH ATLANTIC STATES AWARDS

- 750 Tons, New York, public School No. 114, to Bethlehem Steel Co., Bethlehem, Pa.
- 725 Tons, New York, apartment building, 35th Street and Lexington Avenue, to Schacht Steel Construction Co., New York.
- 470 Tons, Yonkers, N. Y., grandstand extension for Empire City Racing Association, to American Bridge Co., Pittsburgh.
- 360 Tons, Wyndmoor, Pa., addition to Eastern regional aeronautical laboratory, to Bethlehem Steel Co., Bethlehem, Pa., through M. & L. Construction Co., Philadelphia.
- 330 Tons, New York, buildings for Railway Express Agency, to Bethlehem Steel Co., Bethlehem, Pa.
- 250 Tons, Etna, Pa., finishing and pipe storage building for National Supply Co., to Pittsburgh Bridge & Iron Co., Pittsburgh.
- 150 Tons, Philadelphia, fire control building, Frankford Arsenal, to Roy A. Robinson, Philadelphia, through Barclay White Co., Philadelphia.
- 115 Tons, Washington, Pa., chemistry building, Washington and Jefferson College, to O'Brien Steel Construction Co., Washington, Pa.
- 100 Tons, South Boston, housing project to an unnamed fabricator, John Bowen Co., Boston, contractor.

THE SOUTH

- 1540 Tons, Pensacola, Fla., seaplane hangar for Naval Air Station, to Ingalls Iron Works Co., Birmingham.
- 1090 Tons, Woodward County, Okla., bridge, to Capitol Steel & Iron Co., Oklahoma City.
- 360 Tons, Kelly Field, Tex., warehouses, to Mosher Steel Co., Dallas, Tex.
- 225 Tons, Watts Bar, Tenn., lock for TVA, to Lakeside Bridge & Steel Co., Milwaukee.
- 200 Tons, Kentucky Dam, Ky., ICRR lift bridge for TVA, to Continental Bridge Co., Chicago.

CENTRAL STATES

- 2560 Tons, Cleveland, Lake Road generator station, to Fort Pitt Bridge Works Co., Pittsburgh.
- 1215 Tons, Chicago, Cook County bridge section, to American Bridge Co., Pittsburgh.
- 700 Tons, Chicago, Sears, Roebuck & Co., warehouse, to American Bridge Co., Pittsburgh, through B-W Construction Co., Chicago.
- 550 Tons, Albany, Cal., regional agricultural laboratory buildings, to Bethlehem Steel Co., San Francisco.
- 243 Tons, Snohomish County, Wash., Sultan River bridge, to Willamette Iron & Steel Co., Portland, Ore.
- 120 Tons, Scottsburg, Ind., bridge, to Midland Structural Steel Co., Cicero, Ill.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 1900 Tons, Baltimore, boiler rooms and precipitator, unit No. 2, for Consolidated Electric Light & Power Co.
- 1800 Tons, Brooklyn, bulb angle curbing.
- 900 Tons, Green Haven, N. Y., prison buildings.
- 185 Tons, Bristol, Pa., building for Rohm & Haas; Frank V. Warren Co., Philadelphia, general contractor.
- 150 Tons, Dunmore, Pa., high school stadium.
- 140 Tons, Bayonne, N. J., office building for Electric Boat Co.
- 135 Tons, Garfield, N. J., building for Hayden Chemical Corp.
- 115 Tons, Middletown, Conn., store for F. W. Woolworth Co.
- 100 Tons, Weare, N. H., three bridges; Forrest Construction Co., Norwood, Mass., contractor.

CENTRAL STATES

- 1540 Tons, St. Louis and Jefferson Counties, highway bridge, bids due Jan. 5 at Jefferson City, Mo.
- 600 Tons, Lancaster, Ohio, warehouse extension for Anchor Hocking Glass Co.
- 600 Tons, Muscatine, Iowa, State bridge FAP-820-A.
- 550 Tons, Lucas County, Ohio, State bridge over Ottawa River.
- 220 Tons, Cincinnati, manufacturing building for Cincinnati Milling Machine Co.
- 170 Tons, Plainwell, Mich., building for Michigan Paper Co.
- 160 Tons, Dayton, Ohio, test chamber and wind tunnel for War Department, Wright Field.
- 100 Tons, Chicago, Sears, Roebuck & Co., alterations.

WESTERN STATES

- 250 Tons, Pearl Harbor, T. H., gantry crane for drydock construction.

Aluminum Co. to Build Plant at Vancouver

PITTSBURGH—Aluminum Co. of America has selected Vancouver, Wash., as a site for a metal producing plant and has completed arrangements for the purchase of a 200-acre plot of land and the signing of a 20-year power contract with the Bonneville power administration for 32,500 kw. At the outset the reduction works at Vancouver will have a producing capacity of 30,000,000 lb. of aluminum per year, bringing the company's total annual peak capacity to an excess of 400,000,000 lb. It is expected that a carbon electrode works will be built in conjunction with the reduction works. The construction will be done under company supervision and by the company's own construction organization and will require about 12 months for completion.

Steel Window Casings to be Standardized for Housing

WASHINGTON—Manufacturers of steel casement windows and officials of the United States Housing Authority have agreed on a standardization move through which the USHA hopes to save \$80,000 in buying and installing 135,000 steel window casings under its 1940 low-cost housing program. The change, involving the adoption of five standard sizes instead of the existing 50 different sizes

- 236 Tons, San Jose, Cal., Polhemus Street underpass; bids January 17.
- 100 Tons, Bonneville, Ore., transmission towers; Bennett & Taylor, Los Angeles, low bidder on general contract.

FABRICATED PLATES

AWARDS

- 840 Tons, South Charleston, W. Va., 11 tanks for Carbide & Carbon Chemical Corp., to Chicago Bridge & Iron Co., Chicago.
- 510 Tons, Baytown, Tex., 140,000 bbl. tank for Humble Oil & Refining Co., to Chicago Bridge & Iron Co., Chicago.
- 250 Tons, Wheeler, Ala., draft tube gates for TVA, to Carolina Steel & Iron Co., Charlotte, N. C.
- 130 Tons, Lancaster, Pa., six tanks for Pennsylvania Turnpike Commission to Lancaster Iron Works, Lancaster, Pa.

PENDING PROJECTS

- 12,000 Tons, Los Angeles, pipe for Department of Water and Power (Specification 3292); bids Jan. 5.
- 1200 Tons, San Francisco, barges for Pacific Bridge Co.
- 200 Tons, Philadelphia, 20-in. dredging pipe for U. S. Engineers.
- 200 Tons, Bonneville, Ore., caisson; Puget Sound Machinery Depot, low bidder.

SHEET PILING

AWARDS

- 200 Tons, Charleston, S. C., improvement for Dow Chemical Co., to Bethlehem Steel Co., Bethlehem, Pa.

will mean lower installation costs as well as reduced material cost, the USHA said.

The move is one of the first steps taken by manufacturers and USHA technicians to standardize various structural and equipment features for USHA low-cost housing projects in the interest of paring construction costs.

TRADE NOTES

A. M. Castle & Co., Chicago, have started construction on an addition to its Blackhawk Street warehouse to cost \$125,000. Structure will contain 40,000 sq. ft. of floor space and will house heavy carbon and alloy steel bars. As next year will be the company's 50th anniversary the first rivet was of gold and was driven by Alfred C. Castle, president.

Alliance File Corp., 1105 Metropolitan Avenue, Brooklyn, has been organized by John D. Campbell and Harry G. Murcott to manufacture hand-cut files.

Joseph T. Ryerson & Son, Inc., of Chicago, have recently become distributors of McKay certified stainless steel electrodes. These electrodes are stocked by all the Ryerson branches.

William J. Breen & Son, Providence, R. I., have resigned as representatives of William H. Muller & Co., Inc., in the sales of Royal Dutch pig iron, to be effective Jan. 15.

Cleveland Quarries Co., Cleveland, announces that F. W. Holbrook, East Lake, Birmingham, has been appointed sole representative in Tennessee, Georgia, Alabama, Mississippi, North Carolina, South Carolina and Florida for the sale of Buckeye silica firestone.

New Wrinkle, Inc., Dayton, Ohio, licensors of Wrinkle Finishes, has recently appointed the following licensees: John H. Witte & Sons, Burlington, Iowa; St. Louis Surface & Paint Co., St. Louis; Standard Paint & Varnish Co., Windsor, Ont.

...NON-FERROUS...

... *Holiday influence keeps buying interest at low level . . . Export copper eases to 12.65c., f.a.s., for January delivery . . . November lead shipments 64,365 tons; stocks decline to 58,061 tons . . . New prices fixed by British have little effect on market here.*

NEW YORK, Dec. 26—Buying of non-ferrous metals throughout the pre-holiday week was in very light volume. Outside of further easiness in export copper quotations, the price situation remained practically unchanged from the preceding week. Daily copper sales are still running well below the 1000-ton mark, but releases against material on order show little loss in volume, despite the holidays. There was very little

export activity during the week and prices eased to 12.65c., f.a.s., for January shipment, and 12.50c., f.a.s., for February. Domestic quotations remain unchanged at 12.50c. per lb., Connecticut Valley, for the electrolytic grade. The new prices announced by the British on copper, lead and zinc had no noticeable influence on market sentiment here. When the new prices were first announced, a little flurry of speculative copper buying de-

veloped, but this died out as quickly as it started. The new copper price represents an increase of 2.17c. per lb. to Canadian consumers, but the new quotation 12.26c. per lb., calls for delivery at buyers' plant, as against a c.i.f., British ports, basis covered by the previous price.

Zinc

New orders received in the past week were in about the same volume as in the past three weeks, around the 1200-ton level, with the bulk of the sales going to the custom smelter offering metal at 6.39c. per lb., New York. Other selling interests who have not yet acknowledged the 6.39c. price, report little pressure from their customers, although this situation may be altered after the first of the year. New prices on foreign zinc announced last week by the British are equivalent to 5.09c. per lb. to Canadian consumers. This price includes delivery to buyers' plants and duty paid by seller. The new price applies on foreign metal and it is not known yet if Empire prices will be raised a comparable amount. The previous schedule on Empire zinc was 3.53c. per lb., ex-warehouse, duty for buyers' account.

Lead

With shipments in November practically unchanged from the previous month, and production still lagging behind consumption, stocks of refined zinc showed a further decline in November and at the end of the month were less than the tonnage shipped in each of the past three months. Output in November was 48,467 tons against 42,563 tons in October and shipments were 64,365 tons and 66,060 tons respectively. Stocks at the end of November stood at 58,061 tons as compared with 73,963 tons at the end of October and 115,134 tons at the end of November, 1938. Buying during the week held to the preceding week's level, with some buyers showing new interest in January metal. At present that month is about 45 to 50 per cent covered. February books will be opened late this week.

Tin

The Treasury Department last week purchased close to 3000 tons of tin, distributing the tonnage among five suppliers. Total value of the order was \$3,110,000. While this purchase has no observable effect on the market, the earmarking of 3000 tons of tin for the Treasury Department, in addition to the other recent purchases made by the Treasury and the Navy, will have an indirect strengthening influence by absorbing such important tonnages. Domestic buyers continue to show little interest in the market and prices moved within a narrow range all week. Prompt Straits today was quoted at 50.25c. per lb., New York.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Dec. 19	Dec. 20	Dec. 21	Dec. 22	Dec. 23	Dec. 26
Copper, Electrolytic ¹	12.50	12.50	12.50	12.50	12.50	12.50
Copper, Lake	12.50	12.50	12.50	12.50	12.50	12.50
Tin, Straits, New York	50.50	50.75	50.00	50.25	....	50.25
Zinc, East St. Louis ²	6.00	6.00	6.00	6.00	6.00	6.00
Lead, St. Louis ³	5.35	5.35	5.35	5.35	5.35	5.35

¹ Delivered Conn. Valley. Deduct ¼c. for New York delivery. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits pig	51.50c.	Nominal
Copper, Lake	13.75c.	Nominal
Copper, electro	14.00c.	Nominal
Copper, castings	13.625c.	Nominal
*Copper sheets, hot-rolled	21.12c.	21.12c.
*Yellow brass sheets ..	19.31c.	19.31c.
*Seamless brass tubes ..	22.06c.	22.06c.
*Seamless copper tubes ..	21.62c.	21.62c.
*Yellow brass rods	15.23c.	15.23c.
Zinc slabs	7.625c.	8.125c.
Zinc sheets, No. 9 casks ..	12.00c.	12.10c.
Lead, American pig ...	6.50c.	6.125c.
Lead, bar	8.95c.	8.75c.
Lead, sheets, cut	8.50c.	8.50c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	21.50c.	22.50c.
Alum., No. 1 remelt, 98 to 99 per cent	19.00c.	19.50c.
Solder, ½ and ½	31.50c.	Nominal
Babbitt metal, commercial grade	Nominal	Nominal

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33%; on brass sheets and rods, 40; on brass tubes, 33½, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible...	10.25c.	10.875c.
Copper, hvy. and wire...	9.25c.	9.625c.
Copper, light and bottoms	8.25c.	8.75c.
Brass, heavy	5.50c.	6.00c.
Brass, light	4.625c.	5.375c.
Hvy. machine composition	8.50c.	9.125c.
No. 1 yel. brass turnings ..	5.25c.	5.75c.
No. 1 red brass or composition turnings	8.125c.	8.625c.
Lead, heavy	4.50c.	4.875c.
Cast aluminum	9.00c.	10.00c.
Sheet aluminum	14.25c.	15.25c.
Zinc	3.125c.	4.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$155 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.00c. a lb.

IRON AND STEEL SCRAP

... Most district markets either at a standstill or weaker ...

Composite declines 16c. to \$17.67.

DEC. 26—While transactions in scrap dropped to a very low point as the year end approached, the few sales to consumers established prices at lower levels and continued the trend that has been in effect since Oct. 3, except for a slight upward movement at the end of that month. The composite price of No. 1 steel continues to decline, this time 16c. to \$17.67, but is still more than \$2 above the take-off point of \$15.62 from which prices began to soar in early September. Small sales at Chicago and Philadelphia established prices for No. 1 at an average of 25c. less than last week's quotations. Prices at Pittsburgh are nominally unchanged. No sales have been made at Buffalo, but based on mill offers and the fact that embargoes have been placed in effect at two mills, quoted prices are down 50c. Hold-up orders are in effect at many other points also, like Youngstown and Cleveland, although prices are nominally unchanged.

The whole market is awaiting developments in steel mill operations in the first quarter.

Pittsburgh

Transactions were at almost a standstill in the past week owing to holiday influences, and prices are nominal. Some action is expected after the end of the year. Despite the declining tendency in prices recently, brokers have been finding it difficult to pick up odd tonnages at current quotations. Further clarification will be forthcoming soon.

Chicago

A mill sale at \$16.50 was the only activity of the past week in the Chicago market. Brokers can buy an occasional car at \$16 and freely at \$16.25, and the feeling is still one of weakness. The market was very dull the first of this week and brokers expect little life until after Jan. 1. Reductions ranking from 25c. to \$1 a ton were made throughout the list.

Philadelphia

A few small tonnages of No. 1 steel were purchased in the past week at \$18.50, and several small lots of No. 2 material were sold at prices ranging from \$17 to \$17.50. As all district consumers are now paying \$18.50 for No. 1 steel, this material is quoted this

week at a flat \$18.50, representing a decline of 25c. from the average of a week ago. In view of the somewhat confused first quarter production plans of the smaller independent mills in this district, market sentiment is still bearish. One producer is holding up all scrap shipments, while modified restrictions have been instituted by at least two other mills.

Youngstown

Hold-up orders on incoming scrap were distributed by mills around Dec. 20 and have not helped the market out of its doldrums. When shipments are resumed in early January it is believed the drifting tendency may be halted. Nominal quotations on principal grades are unchanged this week.

Cleveland

Lacking evidence for revision of quotations either way, nominal prices are unchanged here this week. Mills started passing out hold-up orders on shipments around Dec. 20. At that time some of the mill buyers had approximately half of their January requirements on order and thus will be protected through nearly the remainder of January, due to the 10 to 15 days' embargo. Opinion varies as to what the early first quarter will bring, considerable depending on open-hearth operations.

Buffalo

The market fell another 50c. as the week passed, with no sales being made and the principal district consumer again lowering its offering price. A sale of machine shop turnings was reported last week by a Buffalo broker at a price within the quoted range for the week. This price falls 50c. this week in line with the general decline. An embargo has been placed upon shipments by two district mills.

St. Louis

The scrap iron market was quiet because of the holidays, and weaker with a lack of buying. Nos. 1 and 2 heavy melting, railroad springs, and railroad malleable were off 50c. a ton. Railroad lists: Chicago, Milwaukee & St. Paul, 1500 tons.

Cincinnati

A holiday lethargy has developed in the local old materials market. Both dealers and the mills are awaiting development in the first quarter. Trading is limited to dealer buying for yard supplies or to apply on old contracts. Some shipments are going forward to

district mills under continuing commitments, but new contracts are lacking. Shipments into the Youngstown and Valley districts are reported to be held up.

Detroit

Seasonal quietness rules the local scrap market but it is reported that the principal consumer in the area will again take scrap after the first of the year. Moreover, the first orders for local furnace consumption since Thanksgiving are reported to have been placed in the last week. Buying prices on these orders are in line with prices quoted on the local market, and as a result it appears that a definite bottom has been reached.

Birmingham

There has been a very definite slowing up of scrap movements here. Orders have been placed, but shipping instructions are lacking. No price changes are expected until subsequent to Jan. 15.

Boston

As usual at the end of a year, business has dropped almost to the vanishing point, and quotations are largely nominal. However, there has been a downward adjustment in prices for blast furnace material and for stove plate that has little relation to actual market conditions. A lack of steamer space for English port delivery, and a complete stoppage of offerings of space for Japan and Italy has put a damper on the export market. At the old Victory plant, Squantum, Mass., barges are loading structural steel scrap and are being towed to New York. A Brooklyn company is dismantling the plant. It is estimated 10,000 tons of steel are involved, for which the salvager paid \$16.50 a ton.

New York

Dullness rules the local market, and prices are nominally unchanged. Not much change is looked for here until the second week of January. The export situation is a little easier, as far as boats are concerned, but the outward bound volume is still below the rate of shipments prevailing earlier in the year.

Toronto

Mixed price action developed in scrap markets during the week. While dealers advanced buying prices \$2 a gross ton on new loose clippings to \$9, they dropped cast iron and stove plate 50c. per ton, and now are paying \$16.50 for machinery cast, \$15.50 for dealers cast and \$11.50 for stove plate. Dealers are making efforts toward building up yard stocks to carry them through the winter months, when offerings from rural districts drop off. Local dealers report a sharp gain in shipments of scrap to electric furnace operators in the Orillia district, and also state that shipments are at a high level to Hamilton and Welland.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$18.00 to \$18.50
Railroad heavy melting	19.00 to 19.50
No. 2 heavy melting	16.75 to 17.25
Scrap rails	20.00 to 20.50
Rails 3 ft. and under	22.50 to 23.00
Comp. sheet steel	18.00 to 18.50
Hand bundled sheets	17.00 to 17.50
Heavy steel axle turn.	16.50 to 17.00
Machine shop turnings	12.50 to 13.00
Short shov. turnings	14.00 to 14.50
Mixed bor. & turn.	12.00 to 12.50
Cast iron borings	12.00 to 12.50
Cast iron carwheels	19.50 to 20.00
Heavy breakable cast.	15.50 to 16.00
No. 1 cupola cast	19.00 to 19.50
RR. knuckles & coup.	22.75 to 23.25
Rail coil springs	23.25 to 23.75
Rail leaf springs	23.25 to 23.75
Rolled steel wheels	23.25 to 23.75
Low phos. billet crops	24.50 to 25.00
Low phos. punchings	21.50 to 22.00
Low phos. heavy plate	21.00 to 21.50
Railroad malleable	20.50 to 21.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$18.50
No. 2 hvy. mltng. steel.	\$17.00 to 17.50
Hydraulic bund., new.	18.50
Hydraulic bund., old.	16.00 to 16.50
Steel rails for rolling	22.50 to 23.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast.	18.50 to 19.00
No. 1 cast	20.50 to 21.00
Stove plate (steel wks)	16.00
Railroad malleable	22.00
Machine shop turn.	12.00 to 12.50
No. 1 blast furnace	11.50
Cast borings	11.50 to 12.00
Heavy axle turnings	15.00 to 15.50
No. 1 low phos. hvy.	23.00 to 24.00
Couplers & knuckles	23.00 to 23.50
Rolled steel wheels	23.00 to 23.50
Steel axles	23.00 to 23.50
Shafting	23.50 to 24.00
Spec. iron & steel pipe	18.00
No. 1 forge fire	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton	
Hvy. mltng. steel	\$16.00 to \$16.50
Auto. hvy. mltng. steel alloy free	15.00 to 15.50
No. 2 auto steel	12.00 to 12.50
Shoveling steel	16.00 to 16.50
Factory bundles	15.25 to 15.75
Dealers' bundles	13.75 to 14.25
No. 1 busheling	14.75 to 15.25
No. 2 busheling, old.	6.00 to 6.50
Rolled carwheels	19.00 to 19.50
Railroad tires, cut	19.25 to 19.75
Railroad leaf springs	18.50 to 19.00
Steel coup. & knuckles	18.50 to 19.00
Axle turnings	15.00 to 15.50
Coil springs	19.50 to 20.00
Axle turn. (elec.)	17.00 to 17.50
Low phos. punchings	19.50 to 20.00
Low phos. plates 12 in. and under	19.00 to 19.50
Cast iron borings	8.50 to 9.00
Short shov. turn.	10.00 to 10.50
Machine shop turn.	8.50 to 9.00
Rerolling rails	19.00 to 19.50
Steel rails under 3 ft.	19.00 to 19.50
Steel rails under 2 ft.	19.50 to 20.00
Angle bars, steel	18.00 to 18.50
Cast iron carwheels	15.25 to 15.75
Railroad malleable	18.50 to 19.00
Agric. malleable	14.50 to 15.00

Per Net Ton	
Iron car axles	21.75 to 22.25
Steel car axles	20.00 to 20.50
Locomotive tires	15.00 to 15.50
Pipes and flues	11.50 to 12.00
No. 1 machinery cast.	13.75 to 14.25
Clean auto. cast	14.00 to 14.50
No. 1 railroad cast.	13.25 to 13.75
No. 1 agric. cast.	11.50 to 12.00
Stove plate	10.00 to 10.50
Grate bars	10.00 to 10.50
Brake shoes	11.50 to 12.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$18.50 to \$19.00
No. 2 hvy. mltng. steel.	17.50 to 18.00
Low phos. plate	21.00 to 21.50
No. 1 busheling	17.75 to 18.25
Hydraulic bundles	18.00 to 18.50
Machine shop turn.	12.50 to 13.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$17.50 to \$18.00
No. 2 hvy. mltng. steel.	16.50 to 17.00
Comp. sheet steel	17.25 to 17.75
Light bund. stampings	15.00 to 15.50
Drop forge flashings	16.50 to 17.00
Machine shop turn.	11.50 to 12.00
Short shov. turn.	12.25 to 12.75
No. 1 busheling	16.75 to 17.25
Steel axle turnings	16.50 to 17.00
Low phos. billet and bloom crops	23.50 to 24.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
No. 2 busheling	11.50 to 12.00
No. 1 cupola cast.	19.50 to 20.00
Railroad grate bars	14.50 to 15.00
Stove plate	14.50 to 15.00
Rails under 3 ft.	22.00 to 22.50
Rails for rolling	21.00 to 21.50
Railroad malleable	21.00 to 21.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$17.00 to \$17.50
No. 2 hvy. mltng. steel.	15.00 to 15.50
Scrap rails	17.50 to 18.00
New hvy. b'ndled sheets	15.50 to 16.00
Old hydraulic bundles	14.50 to 15.00
Drop forge flashings	15.00 to 15.50
No. 1 busheling	15.00 to 15.50
Machine shop turn.	10.50 to 11.00
Shov. turnings	13.50 to 14.00
Mixed bor. & turn.	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Knuckles & couplers	22.00 to 23.00
Coil & leaf springs	22.00 to 23.00
Rolled steel wheels	22.00 to 23.00
No. 1 machinery cast.	18.00 to 18.50
No. 1 cupola cast.	17.00 to 17.50
Stove plate	15.00 to 15.50
Steel rails under 3 ft.	22.50 to 23.00
Cast iron carwheels	18.00 to 18.50
Railroad malleable	19.50 to 20.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	\$16.00 to \$16.50
No. 1 hvy. melting	15.00 to 15.50
No. 2 hvy. melting	14.50 to 15.00
No. 1 locomotive tires	16.50 to 17.00
Misc. stand sec. rails	16.00 to 16.50
Railroad springs	17.50 to 18.00
Bundled sheets	10.00 to 10.50
No. 1 busheling	14.00 to 14.50
Cast bor. & turn.	5.50 to 6.00
Machine shop turn.	7.00 to 7.50
Heavy turnings	10.50 to 11.00
Rails for rolling	13.00 to 13.50
Steel car axles	19.50 to 20.00
No. 1 RR. wrought	11.00 to 11.50
No. 2 RR. wrought	14.50 to 15.00
Steel rails under 3 ft.	19.00 to 19.50
Steel angle bars	16.00 to 16.50
Cast iron carwheels	18.50 to 19.00
No. 1 machinery cast.	17.00 to 17.50
Railroad malleable	17.00 to 17.50
No. 1 railroad cast.	16.00 to 16.50
Stove plate	11.00 to 11.50
Grate bars	10.50 to 11.00
Brake shoes	11.00 to 11.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	\$14.00 to \$14.50
No. 2 hvy. mltng. steel.	12.00 to 12.50
Scrap rails for mltng.	18.00 to 18.50
Loose sheet clippings	9.50 to 10.00
Hydrau. b'ndled sheets	13.50 to 14.00
Cast iron borings	5.00 to 5.50
Machine shop turn.	6.00 to 6.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	4.00 to 4.50
Rails for rolling	19.50 to 20.00
No. 1 locomotive tires	15.50 to 16.00
Short rails	21.00 to 21.50
Cast iron carwheels	16.00 to 16.50
No. 1 machinery cast.	17.50 to 18.00
No. 1 railroad cast.	15.50 to 16.00
Burnt cast	9.00 to 9.50
Stove plate	9.00 to 9.50
Agricul. malleable	14.00 to 14.50
Railroad malleable	17.00 to 17.50
Mixed hvy. cast.	15.00 to 15.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	\$17.00
No. 1 busheling	14.00
Scrap steel rails	17.50

Long turnings	6.00
Cast iron borings	8.50
Stove plate	11.00
Steel axles	21.00
No. 1 RR. wrought	15.00
Rails for rolling	17.50
No. 1 cast	16.00
No. 2 cast	12.00
Cast iron carwheels	14.00
Steel car wheels	17.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	\$13.00 to \$13.50
No. 2 hvy. mltng. steel	12.00 to 12.50
Borings and turnings	7.00 to 7.50
Long turnings	6.50 to 7.00
Short shov. turnings	8.50 to 9.00
No. 1 machinery cast.	13.50 to 14.00
Automotive cast	15.00 to 15.50
Hvy. breakable cast.	10.50 to 11.00
Stove plate	9.00 to 9.50
Hydraul. comp. sheets	13.75 to 14.25
New factory bushel.	12.50 to 13.00
Sheet clippings	8.75 to 9.25
Flashings	12.00 to 12.50
Low phos. plate scrap	13.75 to 14.25

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$14.00 to \$14.50
No. 2 hvy. mltng. steel.	13.00 to 13.50
Hvy. breakable cast.	15.00
No. 1 machinery cast.	16.50 to 17.00
No. 2 cast	13.00 to 13.50
Stove plate	11.50 to 12.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR. wrought	14.00 to 15.00
No. 1 wrought long.	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	19.00 to 20.00
Clean steel turnings*	8.00 to 8.50
Cast borings*	8.00 to 9.00
No. 1 blast furnace	8.00 to 9.00
Cast borings (chem.)	Nominal
Unprepared yard scrap	8.50 to 9.00
Light iron	5.00 to 5.50
Per gross ton, delivered local foundries:	
No. 1 machin. cast.	\$20.00 to \$22.00
No. 2 cast	18.50 to 19.00

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton

Breakable cast	\$12.75 to \$13.00
Machine shop turn.	6.50 to 7.00
Mixed bor. & turn.	5.75 to 6.00
Bun. skeleton long.	9.50 to 10.00
Shafting	18.25 to 18.50
Stove plate	10.50 to 10.65
Cast bor. chemical	9.00 to 9.50
Per gross ton delivered consumers' yards:	
Textile cast	\$16.00 to \$17.00
No. 1 machine cast	16.00 to 17.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel.	\$14.00
No. 2 steel	13.00

PACIFIC COAST

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$16.00 to \$17.50
No. 2 hvy. mltng. steel.	15.00 to 16.50

CANADA

Dealers' buying prices at these yards, per gross ton:

Toronto Montreal	
Low phos. steel	\$12.00 \$11.50
No. 1 hvy. mltng. steel.	11.25 10.75
No. 2 hvy. mltng. steel.	10.00 9.50
Mixed dealers steel	9.25 8.75
Drop forge flashings	10.00 9.50
New loose clippings	9.00 8.50
Busheling	5.50 5.00
Scrap pipe	8.00 7.50
Steel turnings	6.25 5.75
Cast borings	5.75 5.25
Machinery cast	16.50 16.00
Dealers' cast	15.50 15.00
Stove plate	11.50 11.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	\$14.50 to \$15.00
No. 2 hvy. mltng. steel.	13.00 to 13.50
No. 2 cast	13.00 to 13.50
Stove plate	10.50 to 11.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	\$15.75 to \$16.00
No. 2 hvy. mltng. steel.	14.75 to 15.00
Rails (scrap)	16.00
Stove plate	11.50

Philadelphia, delivered alongside boats, Port Richmond.

No. 1 hvy. mltng. steel.	Nominal
No. 2 hvy. mltng. steel.	Nominal

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL

Billets, Blooms and Slabs
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Re-rolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Re-rolling \$34.00
Forging quality 40.00

Sheet Bars
Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open hearth or bessemer \$34.00

Skelp
Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared 1.90c.

Wire Rods
(No. 5 to 9/32 in.)

Per Lb.
Pittsburgh, Chicago or Cleveland 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.45c.
Galveston 2.25c.
9/32 in. to 47/64 in. \$3 a net ton higher.
Quantity extras apply.

SOFT STEEL BARS

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.15c.
Detroit, delivered 2.25c.
Duluth 2.25c.
Philadelphia, delivered 2.47c.
New York 2.49c.
On cars dock Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

RAIL STEEL BARS

(For merchant trade)
Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.15c.
On cars dock Tex. Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 2.15c.
Detroit, delivered 2.25c.
On cars dock Tex. Gulf ports 2.50c.
On cars dock Pacific ports 2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham 2.15c.
Detroit, delivered 2.25c.
On cars dock Tex. Gulf ports 2.50c.
On cars dock Pacific ports 2.50c.

IRON BARS

Chicago and Terre Haute 2.15c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary 2.65c.
Detroit 2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del. 2.10c. to 2.35c.

Philadelphia, del'd 2.15c. to 2.40c.
New York, del'd 2.29c. to 2.54c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg. 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.
Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill
Standard rails, heavier than 60 lb., per gross ton \$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points
Light rails (from billets) per gross ton \$40.00
Light rails (from rail steel) per gross ton 39.00

Base per Lb.
Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports. 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnesota, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.10c.
Detroit, delivered 2.20c.
Philadelphia, delivered 2.27c.
Granite City 2.20c.
On cars dock Pacific ports 2.60c.
Wrought iron, Pittsburgh 4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.05c.
Detroit, delivered 3.15c.
Granite City 3.15c.
Philadelphia, delivered 3.37c.
On cars dock Pacific ports 3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.
From May 10 up to and including May 15, reductions in the base price of hot and cold rolled sheets running from \$4 to \$8 a ton were prevalent. Concessions withdrawn, on May 15.
Subsequent to May 15, many orders originally placed at \$4 to \$8 below the base price were adjusted to the full \$8 concession.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron, Pittsburgh 6.10c.

Electrical Sheets (F.o.b. Pittsburgh)

Base per Lb.
Field grade 3.20c.
Armature 3.55c.

Electrical 4.05c.
Motor 4.95c.
Dynamo 5.65c.
Transformer 72 6.15c.
Transformer 65 7.15c.
Transformer 58 7.65c.
Transformer 52 8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary 3.80c.
F.o.b. cars dock Pacific ports. 4.50c.

Vitreous Enameling Stock, 20 Gage*
Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland 3.35c.
Detroit, del'd 3.45c.
Granite City 3.45c.
On cars dock Pacific ports 3.95c.

TIN MILL PRODUCTS

*Tin Plate

Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary \$5.00
Standard cokes, Granite City 5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

Per Base Box
Granite City \$4.40
Pittsburgh or Gary 4.30

Roofing Terne Plate (F.o.b. Pittsburgh per Package, 112 sheets)

20x14 in. 20x28 in.
8-lb. coating I.C. \$6.00 \$12.00
15-lb. coating I.C. 7.00 14.00
20-lb. coating I.C. 7.50 15.00
25-lb. coating I.C. 8.00 16.00
30-lb. coating I.C. 8.63 17.25
40-lb. coating I.C. 9.75 19.50

Black Plate, 29 gage and lighter
Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports, boxed 4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 2.10c.
Detroit, delivered 2.20c.
On cars dock Pacific ports 2.70c.

Cooperage Stock

Pittsburgh & Chicago 2.20c.
From May 10 up to and including May 15, reductions in the base price of hot rolled strip running from \$4 to \$8 a ton were prevalent. Concessions withdrawn on May 15.
Subsequent to May 15, many orders originally placed at \$4 to \$8 below the base price were adjusted to the full \$8 concession.

COLD ROLLED STRIP*

Base per Lb.
Pittsburgh, Youngstown or Cleveland 2.80c.
Chicago 2.90c.
Detroit, delivered 2.90c.
Worcester 3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip
Pittsburgh, Youngstown, or Cleveland 2.95c.
Detroit, delivered 3.05c.
Worcester 3.35c.

From May 10 up to and including May 15, reductions from the base price of cold rolled strip amounting to \$4 a ton were prevalent. Concessions withdrawn on May 15.

COLD ROLLED SPRING STEEL

Pittsburgh and Cleveland Worcester
Carbon 0.26-0.50% 2.80c. 3.00c.
Carbon 0.51-0.75 4.30c. 4.50c.
Carbon 0.76-1.00 6.15c. 6.35c.
Carbon 1.01-1.25 8.35c. 8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	\$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	\$2.90
Galvanized fence wire	3.30
Twisted barless wire	3.40
Woven wire fence, No. 11 and heavier, base col.	70
Woven wire fence, lighter than No. 11, base col.	67
Single loop bale ties, base col.	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool	\$2.70
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool	\$2.88

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

Steel		Wrought Iron	
In.	Black Galv.	In.	Black Galv.
1/8	56 36	1/4 & 5/8	+9 +30
1/4 to 3/8	59 43 1/2	1/2	24 6 1/2
1/2	63 54	3/4	30 13
3/4	66 1/2 60 1/2	1 & 1 1/4	34 19
1 to 3	68 1/2 60 1/2	1 1/2	38 21 1/2
		2	37 1/2 21

Lap Weld	Butt Weld
2	61 52 1/2
2 1/2	64 55 1/2
3	66 57 1/2
3 1/2	68 59 1/2
4	70 61 1/2
4 1/2	72 63 1/2
5	74 65 1/2
5 1/2	76 67 1/2
6	78 69 1/2
6 1/2	80 71 1/2

Butt weld, extra strong, plain ends	Wrought Iron
In.	Black Galv.
1/2	54 36
3/4	57 43 1/2
1	60 54
1 1/4	63 60 1/2
1 1/2	65 60 1/2

Lap weld, extra strong, plain ends	Wrought Iron
In.	Black Galv.
2	59 51 1/2
2 1/2	62 54 1/2
3	65 57 1/2
3 1/2	68 59 1/2
4	71 61 1/2
4 1/2	74 63 1/2
5	77 65 1/2
5 1/2	80 67 1/2
6	83 69 1/2
6 1/2	86 71 1/2

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.
F.o.b. Gary prices are two points lower discount of \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless	Lap Weld
	Cold Drawn	Hot Rolled
1 in. o.d.	12 B.W.G. \$ 9.01	12 B.W.G. \$ 9.32
1 1/4 in. o.d.	13 B.W.G. 10.67	13 B.W.G. 10.98
1 1/2 in. o.d.	13 B.W.G. 11.70	13 B.W.G. 12.01
1 3/4 in. o.d.	13 B.W.G. 13.42	13 B.W.G. 13.73
2 in. o.d.	13 B.W.G. 15.03	13 B.W.G. 15.34
2 1/4 in. o.d.	13 B.W.G. 16.76	13 B.W.G. 17.07
2 1/2 in. o.d.	12 B.W.G. 18.45	12 B.W.G. 18.76
2 3/4 in. o.d.	12 B.W.G. 20.21	12 B.W.G. 20.52
3 in. o.d.	12 B.W.G. 22.48	12 B.W.G. 22.79
3 1/4 in. o.d.	11 B.W.G. 28.37	11 B.W.G. 28.68
3 1/2 in. o.d.	10 B.W.G. 35.20	10 B.W.G. 35.51
4 in. o.d.	10 B.W.G. 43.04	10 B.W.G. 43.35
5 in. o.d.	9 B.W.G. 54.01	9 B.W.G. 54.32
6 in. o.d.	7 B.W.G. 82.93	7 B.W.G. 83.24

Extras for less carload quantities:

	Base
40,000 lb. or ft. over	5%
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	30%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	\$54.80
6-in. and larger, del'd New York	52.20
*6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, \$3 extra
4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45, Birmingham, and \$53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
1/2 in. and 6 in. and smaller	68 1/2
Larger and longer up to 1 in.	66
1 1/2 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68 1/2
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclusive	64
1 1/2 in. to 1 1/2 in. incl.	62
1 1/2 in. and larger	60

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts U.S.S. S.A.E.	
1/2 in. and smaller	67 70
9/16 in. to 1 in.	64 65
1 1/2 in. and larger	62 62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, with nuts loose	72 1/2
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83 1/2

On stove bolts freight is allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

Large Rivets

(1/2 in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$3.40
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Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10
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Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread 1/4 in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs
F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.	
Open-hearth grade, base	2.70c.
Delivered, Detroit	2.80c.
S.A.E. Alloy Series	
Numbers	Differential per 100 Lb.
200 (1/2% Nickel)	\$0.35

2100 (1 1/2% Nickel)	\$0.75
2300 (3 1/2% Nickel)	1.55
2500 (5% Nickel)	2.25
31 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.30
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4340 Chr.-Ni.-Mo.	1.65
4345 Chro.-Ni.-Mo.	1.85
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
6100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.60c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

No.	No.	No.	No.
410	430	442	446
Bars 18.50c.	19c.	22.50c.	27.50c.
Plates 21.50c.	22c.	25.50c.	30.50c.
Sheets 26.50c.	29c.	32.50c.	38.50c.
Hot stp. 17c.	17.50c.	24c.	35c.
Cold stp. 22c.	22.50c.	32c.	52c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 8c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	31s. 6d.
Steel bars, open hearth	12 1/2 5s.*
Beams, open hearth	11 1/2 2s. 6d.*
Channels, open hearth	11 1/2 7s. 6d.*
Angles, open hearth	11 1/2 2s. 6d.*
Black sheets, No. 24	
gage	15 1/2 12s. 6d. max.*
Galvanized sheets, No. 24	
gage	18 1/2 2s. 6d. max.*

* Empire markets only.

CONTINENTAL

Per Gross Ton, Gold \$
f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	25 10s.
Steel bars, merchants	25 5s.
Sheet Bars	Nominal
Plate 1/4 in. and up	25 7s. 4
Plate 3/16 in. and 5 mm.	25 13s.
Sheet 1/4 in.	25 9s. 6d.
Beams, Thomas	24 18s.
Angles (Basic)	24 18s.
Hoops and strip, base	25 12s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$24.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00
Delivered Brooklyn	26.50
Delivered Newark or Jersey City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown..	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, delivered Cincinnati.	23.06
Northern, delivered, Cincinnati	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	19.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown..	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	\$24.00
F.o.b. Everett, Mass.	25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth	24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown ..	23.50
F.o.b. Birmingham	24.00
Delivered Cincinnati	24.11
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo....\$28.50

Gray Forge

Valley or Pittsburgh furnace..\$22.50

Charcoal

Lake Superior furnace	\$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Foundry iron	\$27.50 base
Malleable	28.00 base
Basic	27.50 base

Toronto

Foundry iron	\$25.50 base
Malleable	26.00 base
Basic	25.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.	
Domestic, 80% (carload).....	\$100.00

Spiegeleisen

Per Gross Ton Furnace	
Domestic, 19 to 21%	\$32.00
Domestic, 26 to 28%	39.50

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size	
50% (ton lots, packed)	\$82.00*
50% (ton lots in 50 gal. bbl) ..	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots, packed)	142.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio	
Per Gross Ton	
10.00 to 10.50%	\$32.50
For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.	
For each unit of manganese over 2%, \$1 per ton additional.	
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	

Silvery Iron

Per Gross Ton	
F.o.b. Jackson, Ohio, 5.00 to 5.50%	\$27.50
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton. The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	
Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.	

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract	
4 to 6% carbon	\$11.00c.*
2% carbon	17.50c.*
1% carbon	18.50c.*
0.10% carbon	20.50c.*
0.06% carbon	21.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract	
8% carbon	\$98.00
2.50% carbon	103.00
2% carbon	108.00
1% carbon	118.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del. carloads....	\$2.00
Ferrotungsten, 100 lbs. and less	2.25
Ferrovanadium, contract, per lb. contained V., delivered	\$2.70 to \$2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	\$2.25†
Ferrocobaltititanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	\$142.50
Ferrocobaltititanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	\$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton	\$58.50
Ferrophosphorus, electrolytic 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville	\$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo. f.o.b. Langeloth, Pa.	80c.

* Spot prices are \$5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.50%...\$5.25	
Old range, non-Bessemer, 51.50% ..	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50% ..	4.95
High phosphorus, 51.50%	4.85

Foreign Ores*

C.i.f. Philadelphia or Baltimore	
Per Unit	
Iron, low phos., copper free, 55 to 58% dry, Algeria	13c.
Iron, low phos., Swedish, average, 68 1/4% iron	13c.
Iron, basic or foundry, Swedish, aver. 65% iron	11c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	50c.
Man., African, Indian, 44-48%	45c.
Man., African, Indian, 49-51%	45c.
Man., Brazilian, 46 to 48%	44c.

Per Short Ton Unit	
Tungsten, Chinese, Wolframite, duty paid, delivered \$23.00 to \$24.00	
Tungsten, domestic, scheelite delivered	23.00 to 25.00
Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	\$18.00
Rhodesian, 45%	22.00
Rhodesian, 48%	25.00
Turkish, 48-49%	29.00
Turkish, 45-46%	24.50
Turkish, 40-41%	22.00
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	Nominal
48-49%	Nominal

* All foreign ore prices are nominal

FLUORSPAR

Per Net Ton	
Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	\$22.00
Domestic, f.o.b. Ohio River landing barges	\$22.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines \$20.00 to 22.00	
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	\$25.00 to \$25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	\$31.00
ditto, in bags, f.o.b., same mines	\$32.60

FUEL OIL

Per Gal.	
No. 2, f.o.b. Bayonne, N. J.	4.70c.
No. 6, f.o.b. Bayonne, N. J.	2.74c.
No. 5 Bur. Stds., del'd Chicago 3.25c.	
No. 6 Bur. Stds., del'd Chicago 2.75c.	
No. 3 distillate, del'd Cleve'd. 5.375c.	
No. 4 industrial, del'd Cleve'd. 5.125c.	
No. 5 industrial, del'd Cleve'd. 4.25c.	
No. 6 industrial, del'd Cleve'd. 4.00c.	

COKE

Per Net Ton	
Furnace, f.o.b. Connells-ville, Prompt	\$5.00 to \$5.50
Foundry, f.o.b. Connells-ville, Prompt	5.75 to 6.25
Foundry, by - product Chicago ovens	10.50
Foundry, by - product del'd New England....	12.50
Foundry, by - product del'd Newark or Jersey City	11.38 to 11.90
Foundry, by - product Philadelphia	11.13
Foundry, by - product delivered Cleveland ..	11.05
Foundry, by - product delivered Cincinnati ..	10.50
Foundry, Birmingham..	7.50
Foundry, by - product del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
Plates	3.40c.
Shapes	3.40c.
Soft steel bars and small shapes	3.35c.
Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.65c.
Hot rolled strip	3.60c.
Hot rolled sheets	3.35c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.75c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb. kegs)	2.65c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb. On reinforcing bars base applies to orders of less than one ton and includes switching and starting charge. All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
*Plates, 1/4 in. and heavier	3.76c.
*Structural shapes	3.75c.
*Soft steel bars, round	3.84c.
Iron bars, Swed. charcoal	9.50c.
**Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.09c.
Flats up to 12 in. wide	4.09c.
Cold-rolled strip soft and quarter hard	3.51c.
*Hot-rolled strip, soft O.H.	3.96c.
*Hot-rolled sheets (8-30 ga.)	3.58c.
**Galv. sheets (24 ga.)	5.23c.
Long ternes (24 ga.)	5.90c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.35c.
SAE, 3100, hot-rolled	5.90c.
SAE, 6100, hot-rolled annealed	8.75c.
SAE, 2300, cold-rolled	8.59c.
SAE, 3100, cold-rolled, annealed	8.19c.
*Floor plate, 1/4 in. and heavier	5.56c.
Standard tool steel	12.50c.
Wire, black, annealed	4.85c.
Wire, galv. (No. 9)	4.70c.
O. H. spring steel, flats	4.70c.
Common wire nails, per keg	3.50c.

* For lots 400 to 1999 lb.
** For lots less than 1500 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.50c.
Soft steel squares, hexagons, channels and Tees	3.65c.
Hot rolled strip	3.60c.
Floor plates	5.15c.
Hot rolled sheets	3.35c.
Galvanized sheets	4.85c.
Cold rolled sheets	4.30c.
Cold finished carbon bars	3.75c.
Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.	

CLEVELAND

	Base per Lb.
Plates	3.40c.
Structural shapes	3.58c.
Soft steel bars	3.25c.
Cold-fin. bars (1500 lb., over.)	3.75c.
Hot-rolled strip	3.50c.
Cold rolled sheets	4.05c.
Cold-finished strip	3.20c.
Galvanized sheets (No. 24)	4.72c.
Hot-rolled sheets	3.35c.
Floor plates, 3/16 in. and heavier	5.18c.
Black ann'd wire, per 100 lb.	\$3.10
No. 9 galv. wire, per 100 lb.	3.50
Com. wire nails, base per keg	2.75
Hot rolled alloy steel (3100)	5.85c.
Cold rolled alloy steel (3115)	6.75c.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 400 to 1499 lb.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.47c.
Bars, soft steel (rounds and flats)	3.62c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.77c.
Cold fin. rounds, shafting, screw stock	4.02c.
Galv. sheets (24 ga.)	4.52c.
Hot rolled sheets	3.38c.
Galv. corrugated sheets, 24 ga. and heavier*	4.57c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	3.85c.
Plates, 1/4 in. and heavier	3.85c.
Bars	3.88c.
Heavy hot rolled sheets	3.71c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.61c.
Galvanized sheets	4.61c.
Cold rolled sheets	4.71c.
The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb., plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.	

BUFFALO

	Base per Lb.
Plates	3.62c.
Floor plates	5.25c.
Struc. shapes	3.40c.
Soft steel bars	3.35c.
Reinforcing bars (20,000 lb. or more)	2.15c.
Cold-fin. flats, squares, rounds, and hex.	3.65c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes No. 8 to 30 ga.	3.35c.
Galv. sheets (24 ga.)	4.70c.
Rands and hoops	3.82c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

	Fire Clay Brick
Super-duty brick, at St. Louis	\$60.30
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

	Silica Brick
Per 1000 f.o.b. Works	
Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement per net ton (East-ern)	3.55

	Chrome Brick
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	\$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

	Magnesite Brick
Standard f.o.b. Baltimore and Chester	\$67.00
Chemically bonded, f.o.b. Baltimore	57.00

	Grain Magnesite
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	\$45.00
Domestic, f.o.b. Baltimore and Chester in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.90

PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	3.55c.
*Structural shapes	3.55c.
*Soft steel bars small shapes, iron bars (except bands)	3.35c.
†Reinforc. steel bars, square and deformed	2.76c.
Cold-finished steel bars	4.16c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	3.85c.
*Spring steel	5.00c.
*Hot-rolled anneal. sheets	3.55c.
†Galvanized sheets (No. 24)	4.93c.
*Diam. pat. floor plates, 1/4 in.	5.25c.

*For quantities between 400 and 1999 lb.
†For 10 bundles or over.
‡For one to five tons.

BIRMINGHAM

	Base per Lb.
Bars and bar shapes	3.50c.
Structural shapes and plates	3.55c.
Hot rolled sheets No. 10 ga.	3.35c.
Galvanized sheets No. 24 ga.	4.75c.
or more	
Strip	3.60c.
Reinforcing bars	3.50c.
Floor plates	5.88
Cold finished bars	4.43
Machine and carriage bolts	50 & 10 off list
Rivets (structural)	\$4.60 base
On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are f.o.b. consumer plant.	

PACIFIC COAST

	San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	4.00c.	3.80c.	3.40c.
Shapes, standard	4.00c.	3.80c.	3.50c.
Soft steel bars	4.00c.	3.95c.	4.00c.
Reinforcing bars, f.o.b. cars dock	2.525c.	open.	2.975c.
Hot-rolled sheets (No. 10)	3.85c.	4.10c.	3.70c.
Galv. sheets (No. 24 and lighter	5.15c.	5.00c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	5.00c.	4.75c.
Cold-finished steel			
Rounds	6.80c.	6.60c.	7.00c.
Squares and hexagons	8.05c.	7.85c.	8.25c.
Flats	8.55c.	8.35c.	8.25c.
Common wire nails—base per keg less carload	3.25c.	3.25c.	3.15c.

All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

	Base per Lb.
Soft steel bars	3.58c.
Structural shapes	3.80c.
Plates	3.75c.
Floor plates	5.42c.
Hot-rolled sheets, 8 to 30 gages above 12 in. and 3/16 in., 24 in. to 48 in. wide	3.43c.
Cold-rolled sheets	4.50c.
*Galvanized sheets	4.84c.
Hot-rolled strip	3.68c.
Cold-finished bars	3.80c.
Cold-rolled strip	3.40c.
Hot-rolled alloy steel (SAE 3100 Series)	5.97c.
Cold-rolled alloy (SAE 2300)	8.45c.

Quantity extras apply to all items.
*Price applies only in metropolitan Detroit.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Electric Boat Co., 40 Wall Street, New York, plans new shipyard on site adjoining plant of Electro Dynamic Works, foot of North Street. Bayonne, N. J., a subsidiary, manufacturer of generators, motors, etc. New plant will be used for construction of motor torpedo boats and submarine chasers for United States Navy, and will give employment to about 1000 men. Completion is scheduled next spring. Cost over \$600,000 with equipment.

Beverwyck Breweries, Inc., North Ferry Street, Albany, N. Y., has let general contract to J. P. Sewell, Hudson Avenue, for one-story addition for a mechanical-bottling unit. Cost close to \$50,000 with equipment. Harley & Ellington, Stroh Building, Detroit, are architects.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Jan. 6 for 50 to 250 power units (Circular 203).

Sinclair Refining Co., 630 Fifth Avenue, New York, plans expansion and modernization of oil refinery on Houston ship channel, Houston, Tex., including new production units, extension in steel tank storage department and other facilities. Cost close to \$4,000,000 with equipment. Houston offices of company are in Gulf Building.

Third Dimension Sign Co., 20 West Twenty-second Street, New York, advertising displays, has leased floor in building at 55 East Sixteenth Street for expansion.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 2 for one motor-driven universal tool grinder with accessories (Schedule 186) for Brooklyn Navy Yard; three gear motors and spare parts, and one stop switch (Schedule 207), drills, reamers and grinders (Schedule 219), 36-in. wet tool grinder (Schedule 188), high-speed radial drill press (Schedule 144), welding positioner (Schedule 192), four double-end wet grinders (Schedule 187); until Jan. 5, radial drill press (Schedule 205) for Philadelphia yard, all motor-driven; 23,300 lb. steel strapping (Schedule 146) for Brooklyn and Mare Island yards.

Gleitsman's, Inc., Dry Harbor Road, Glendale, L. I., manufacturer of bathroom fixtures and equipment, has leased three floors, about 100,000 sq. ft. floor space in buildings at First Avenue and Astoria Boulevard, Long Island City, for plant. Modernization will cost about \$60,000 exclusive of machinery.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Jan. 3 for jigs and milling fixtures (Circular 340); until Jan. 11, one thread-milling machine (Circular 335).

Wright Aeronautical Corp., 132 Beckwith Avenue, Paterson, N. J., airplane engines and parts, subsidiary of Curtiss-Wright Corp., has asked bids on general contract for one-story addition for a dynamometer test building. Cost over \$75,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer. Curtiss-Wright Corp., Propeller Division, 64 Lakeview Avenue, Clifton, N. J., another unit of organization, has let general contract to Mahony-Troast Construction Co., 657 Main Avenue, Passaic, N. J., for one-story addition, 100 x 110 ft. Cost close to \$85,000 with equipment. Company recently has acquired hollow steel blade-manufacturing division of Pittsburgh Screw & Bolt Corp., Pittsburgh, specializing in propeller production, and will consolidate with organization at Clifton.

Commanding Officer, Ordnance Department, Raritan Arsenal, Raritan, N. J., asks bids until Jan. 2 for one electric-operated test stand, motor-driven boring machine, power gun, and combination drilling, countersinking, brake-lining, grinding and riveting machine (Circular 85).

M. L. Bayard & Co., Inc., Twentieth Street and Indiana Avenue, Philadelphia, machinist, has let general contract to Haverstick-Borthwick Co., Schaff Building, for one-story addition. Cost close to \$40,000 with equipment.

Bethlehem Steel Co., South Bethlehem, Pa., has asked bids on general contract for one-story addition, 80 x 425 ft., to wire rope division plant at Williamsport, Pa., for storage and distribution. A crane and other mechanical-handling equipment will be installed. Cost over \$200,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Bridesburg, Philadelphia, asks bids until Jan. 2 for motor drives on 46 machines (Circular 907); until Jan. 3, gages for primer percussion units (Circular 941), gages for demolition bombs (Circular 940); until Jan. 9 for 150 to 175 flank spotting instruments, with alternate bids on 193 to 425, and spare parts (Circular 633).

◀ BUFFALO DISTRICT ▶

Hambleton Terminal Corp., River Road, Tonawanda, Buffalo, oil and gasoline products, plans new refinery for gasoline production, to operate under catalytic process, including steel tank storage department, pumping station, power house and other operating facilities. Cost close to \$1,400,000 with equipment.

Doehler Die-Casting Co., Batavia, N. Y., has asked bids on general contract for one-story addition for expansion in foundry. Cost close to \$50,000 with equipment. Main offices are at 2100 Smead Avenue, Toledo, Ohio.

Blackstone Mfg. Co., Jamestown, N. Y., washing and ironing machines and parts, etc., plans one-story addition, 80 x 250 ft. Cost close to \$75,000 with equipment.

◀ WASHINGTON DIST. ▶

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for electric-operated traveling bridge cranes, 50-ft. long, for New York, Philadelphia and Norfolk Navy yards (Specifications 9547).

Crown Cork & Seal Co., Eastern Avenue and Kresson Street, Baltimore, metal bottle seals, capping machines and parts, has let general contract to Cummins Construction Co., 803 Cathedral Street, for three one-story additions to buildings Nos. 64, 65 and 66. Cost about \$80,000 with equipment. Lucius R. White, Jr., 10 West Chase Street, is architect.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Jan. 3 for shop and garage equipment, including drills, grinders, air compressors, valve refacers, brake shoe reliners, engine lathes, welding outfits, sander, battery chargers, etc. (Circular 398-88).

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Jan. 3 for common wire nails (Circular 393); until Jan. 4 for 4000 valves for one-ton chlorine containers, and 1000 handwheels (Circular 394).

Gardner Extract Co., Monterey, Va., food specialties, has approved plans for new one-story plant about six miles from city, for which superstructure will begin at once. Cost close to \$40,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until Jan. 2 for 400,000 lb. of steel wire nails, 47,000 lb. of galvanized nails, 40,000 lb. of steel wire finishing nails, 39,500 lb. of galvanized steel wire finishing nails, 20,000 lb. of galvanized steel wire roofing nails, 10,000 lb. of galvanized iron or steel flooring nails, 2000 lb. of copper wire slating nails, 3700 lb. of copper wire nails, and 3000 lb. of steel wire casing nails (Schedule 3809), 464,000 lb. of tracks, anchors and accessories for installation of barge tracks (Schedule 3798), 10 air-driven sump pumps (Schedule 3812), 5800 pipe clamp assemblies

for 2½-in. brass pipe, with steel pads and steel bolts (Schedule 3808).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 2 for one pipe-threading machine (Schedule 121), three motor-driven arc welding machines and 30 outlet welding panels (Schedule 183) for Portsmouth, N. H., Navy Yard; one steam drop hammer (Schedule 141), two motor-driven turret lathes (Schedule 162); until Jan. 5, two motor-driven precision toolmaker's lathes (Schedule 185) for Norfolk yard.

◀ NEW ENGLAND ▶

Heald Machine Co., New Bond Street, Worcester, Mass., grinding and other machines and parts, has let general contract to E. J. Cross Co., 150 Prescott Street, for one-story addition, 120 x 240 ft. Cost over \$100,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

Commanding Officer, Ordnance Department, Watertown Arsenal, Watertown, Mass., asks bids until Jan. 15 for one horizontal boring, drilling, milling and planing machine (Circular 292).

Atlantic Gelatin Co., Inc., Hill Street, Woburn, Mass., has asked bids on general contract for steam power house at plant, about 60 x 60 ft., with 175-ft. reinforced-concrete stack. Cost close to \$50,000 with boilers and other equipment.

Arter Grinding Machine Co., 15 Sagamore Road, Worcester, Mass., grinding machines and parts, has let general contract to E. Whitehead, Inc., 62 School Street, for one-story addition, 90 x 100 ft. Cost close to \$40,000 with equipment.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Jan. 2 for eight sets of high-speed steel milling cutters (Circular 218), revolver parts, including bolts, rods, plates, frames, stocks, etc. (Circular 210); until Jan. 3, three motor-driven 10-in. toolroom lathes (Circular 211); until Jan. 8, parts for machine guns, including screws, plugs, adjusting plates, etc. (Circular 213); until Jan. 11, three milling machines (Circular 158).

◀ SOUTH ATLANTIC ▶

Merrill-Stevens Dry Dock Co., N. W. Eleventh Street, Miami, Fla., has asked bids on general contract for one-story shop, 195 x 220 ft., at shipyard at N. W. Seventeenth Avenue and waterfront, for storage and distribution; also for three new boat slips, each 45 x 212 ft. Cost over \$100,000 with equipment. Robert E. Collins, 9 N. W. Third Street, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 2 for one motor-driven, open-side planer (Schedule 135) for Charleston, S. C., yard.

Savannah Electric & Power Co., Savannah, Ga., plans expansion and improvements in Riverside steam-electric generating station, including new high-pressure boiler units and other equipment. Work is scheduled to be carried out next spring. Cost about \$300,000.

◀ SOUTH CENTRAL ▶

International Harvester Co., 180 North Michigan Avenue, Chicago, will take bids on general contract early in 1940 for new factory branch, storage and distributing plant for motor truck and farm machinery divisions on three-acre tract recently purchased at Greenwood and Mansfield Roads, Shreveport, La. It will include machine and repair shops, service department and other mechanical divisions, with boiler house and other departments. Cost over \$175,000 with equipment.

George Wiedemann Brewing Co., 601 Columbia Street, Newport, Ky., plans extensions and improvements in power house, including new 400-hp., watertube boiler, with stoker and accessories, and remodeling various present equipment. Fosdick & Hilmer, Union Trust Building, Cincinnati, are consulting engineers.

Robbins Tire & Rubber Co., Muscle Shoals, Ala., automobile tires and other rubber goods, plans rebuilding part of mill recently de-

stroyed by fire. Loss close to \$175,000 with equipment.

Union Light & Power Co., Third Street and Court Avenue, Covington, Ky., plans one-story equipment storage and distributing plant, with machine shop and garage facilities for company motor trucks. Cost about \$150,000 with equipment.

◀ SOUTHWEST ▶

Shell Oil Co., Inc., Shell Building, St. Louis, has acquired about three blocks of property at Port Everglades, Fla., for new tank farm, and bulk oil storage and distributing plant. It will comprise several large one-story buildings, steel tanks, pumping station, power house, pipe lines and other facilities. Cost close to \$1,000,000 with equipment. Company has work under way on expansion and improvements at oil refinery on Houston ship channel, Houston, Tex., including new alkylating units, to cost about \$1,500,000.

Machinery & Welder Corp., 2833 Locust Street, St. Louis, welding apparatus and other mechanical equipment, has let general contract to Murch-Jarvis Co., Inc., Railway Exchange Building, for new one-story plant, 85 x 120 ft., with extension, 30 x 40 ft., on South Spring Avenue. Cost close to \$50,000 with equipment. H. S. Van Hoefen, Railway Exchange Building, is architect.

Union Jobbing Association, 610 North Quincy Street, Topeka, Kan., Harry E. Witham, secretary and general manager, will take bids soon for extensions in grain elevator, including new headhouse, storage bins, mechanical handling equipment and other facilities. Cost over \$60,000 with equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

Johnston Tin Foil & Metal Co., 6106 South Broadway, St. Louis, has let general contract to Stauder Construction Co., 6101 Adkins Street, for one-story top addition to plant. Cost about \$45,000 with equipment. O'Meara & Hills are architects, and G. E. Quick, engineer, both 5709 Waterman Avenue.

Republic Oil Refining Co., Texas City, Tex., has begun expansion and improvements in local refinery, to include new equipment for high octane gasoline production, steel tanks and other equipment. Cost close to \$1,500,000 with machinery.

Evergreen Farms Co., Raymondville, Tex., W. A. Hardin, head, has approved plans for new dehydration plant comprising several units. Cost over \$85,000 with equipment.

◀ OHIO AND INDIANA ▶

Ohio Crankshaft Co., 6600 Clement Avenue, Cleveland, automobile crankshafts and allied equipment, has let general contract to J. L. Hunting Co., Ninth-Chester Building, for one-story addition, 55 x 120 ft., to be used as a machine shop. Cost about \$60,000 with equipment. Wallace Hatch, Hippodrome Building, Annex, is architect.

Construction Quartermaster, Wright Field, Dayton, Ohio, asks bids until Jan. 3 for two centrifugal vacuum return pumps (Circular 6681-29).

Coca-Cola Bottling Co., Defiance, Ohio, plans one and two-story addition to mechanical-bottling plant, and improvements in present works. Cost over \$45,000 with equipment. T. Y. Hewlett, Richardson Building, Toledo, Ohio, is architect; Gil Southern and O. H. Hartman, Nicholas Building, Toledo, are engineers.

National Screw & Mfg. Co., 2440 East Seventy-fifth Street, Cleveland, bolts, screws, screw machine products, etc., has begun erection of one-story addition, 63 x 85 ft., for which general contract recently was let to Sam W. Emerson Co., 1836 Euclid Avenue. Cost close to \$40,000 with equipment.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Jan. 3 for 100 tail dolly wheel assemblies (Circular 813), four air conditioners (Circular 818), middle guide-type chain and chain sprockets (Circular 805), tire valve dust caps, tire valve caps, tire valve cores, valve inside cores, valve stem extensions, etc. (Circular 811); until Jan. 4, jeweler's anvils and hammers, dust blowers, broaches, knives,

pliers, punches, etc. (Circular 814); until Jan. 5 for 16,425 self-locking padlocks (Circular 807), control assemblies, pulley, regulator, trap, and valve assemblies (Circular 793); until Jan. 8, starter assemblies (Circular 792), 35 instrument field testing set assemblies (Circular 806), galvanized iron buckets and corrugated cans (Circular 819).

P. R. Mallory Co., Inc., 3029 East Washington Street, Indianapolis, electrical equipment, welding apparatus, special alloys, etc., has asked bids on general contract for one-story addition. Cost about \$40,000 with equipment. D. A. Bohlen & Son, Majestic Building, are architects.

◀ WESTERN PA. DIST. ▶

Lord Mfg. Co., 1635 West Twelfth Street, Erie, Pa., aircraft motor mountings and other mechanical equipment, has let general contract to H. Platt Co., 922 Raspberry Street, for one-story rear addition, 38 x 210 ft., with extension, 26 x 104 ft. Cost over \$50,000 with equipment. Joseph Schmid, 1449 West Tenth Street, is architect.

Martin Mining Co., Martin, Pa., plans rebuilding tippie at coal-mining properties, recently destroyed by fire. Loss about \$70,000 with equipment.

Carnation Co., North Van Buren Street, Milwaukee, condensed and evaporated milk products, plans new branch plant on U. S. Highway 50, near Clarksburg, W. Va., consisting of one-story main unit for processing service, storage and distributing buildings, and other structures. Cost about \$250,000 with equipment.

◀ MICHIGAN DISTRICT ▶

Wilcox-Rich Division, Eaton Mfg. Co., Battle Creek, Mich., automobile engine parts and other automotive equipment, has let general contract to G. O. Lewis Co., Battle Creek, for one-story addition. Cost about \$175,000, of which about \$100,000 will be expended for equipment. Main offices are at 9771 French Road, Detroit.

Studebaker Corp., West Jefferson Avenue, Detroit, has begun erection of one-story addition and improvements in local plant No. 18. Cost close to \$50,000 with equipment. Contract was let recently to Esslinger-Misch Co., 159 East Columbia Street.

Congress Tool & Die Co., Mount Elliott Avenue and Outer Drive, Detroit, die-castings, special machinery, flexible couplings, etc., will install 5-ton craneway and other mechanical-handling equipment in one-story addition, about 20,000 sq. ft. floor space, for which general contract recently was let to Austin Co., Cleveland. Cost over \$100,000 with equipment.

Agerstrand Corp., Muskegon, Mich., commercial heat treater and manufacturer of tools, dies and light machinery, is doubling capacity of its plant at 1823 Commerce Street. C. F. Agerstrand is president; A. Alstrom is general contractor.

◀ MIDDLE WEST ▶

Western Electric Co., Cicero Avenue and Cermak Road, Cicero, Chicago, telephone equipment, instruments, etc., has asked bids on general contract for one-story addition, 100 x 100 ft., and improvements in present plant unit. Cost over \$85,000 with equipment. A. T. Hunt is chief engineer for company.

Union Machinery Co., West Van Buren Street, Joliet, Ill., baker's wrapping machinery and allied equipment, parts, etc., plans one-story addition, 65 x 100 ft. Cost over \$40,000 with equipment. Work is scheduled to begin early in spring.

Chesapeake & Ohio Railway Co., 327 South LaSalle Street, Chicago, has let general contract to John S. Metcalf Co., 111 West Jackson Street, for new grain elevators at 103rd Street and Calumet River, consisting of 36 silos, 24 x 112 ft., with adjoining one-story buildings. Cost over \$500,000 with elevating, conveying, screening and other mechanical-handling equipment.

Fisher Governor Co., 205 First Avenue, Marshalltown, Iowa, engine governors, steam

and oil specialties, has asked bids on general contract for two-story addition, 120 x 180 ft. Cost about \$65,000 with equipment. R. H. Vandercook, 11 West State Street, is architect.

California Packing Corp., Edgar, Wis., food canner and packer, will take bids early in January for one-story addition, 70 x 100 ft. Cost about \$45,000 with equipment. Main offices are at 101 California Street, San Francisco.

Bureau of Reclamation, Denver, asks bids until Jan. 2 for one 1½-yd. clutch-operated, crawler traction mounted full-revolving diesel-powered convertible-type dragline excavator, with 40-ft. boom, shovel attachment, including dipper and other accessories, for Tucumcari project, New Mexico; similar 1½-cu. yd. excavator, with 60-ft. boom, etc., same location; and one 1¼-cu. yd. similar excavator, with 45-ft. boom, for Rio Grande project, New Mexico-Texas (Specifications 1318-D).

Victor Vending Corp., 4203 West Fullerton Avenue, Chicago, vending machines and parts, has asked bids on general contract for one-story addition, 45 x 100 ft. Cost about \$40,000 with equipment. Ernest N. Braucher, 6 North Clark Street, is architect.

◀ PACIFIC COAST ▶

Consolidated Aircraft Corp., San Diego, Cal., airplanes and parts, has plans for expansion, comprising several one-story additions for parts production and assembling. Cost about \$1,000,000 with equipment. Edward G. and Ellis W. Taylor, 903 West Third Street, Los Angeles, are architects.

Bureau of Reclamation, Denver, asks bids until Jan. 8 for three 30,000-kva., vertical shaft electric generators and accessories, for Parker power plant, Parker dam power project, Arizona-California (Specifications 888).

Beaver Portland Cement Co., Lumbermen's Building, Portland, plans new hydroelectric power plant at Gold Hill, Ore., for power supply for cement mill at that place, including power dam, generating station, switching station and other facilities. Cost about \$150,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 2 for three motor-driven water-cooled mill paint machines (Schedule 71), one similar machine (Schedule 72), 75-ton steam platen hydraulic press (Schedule 128), motor-driven toolmaker's precision lathe (Schedule 74), four 50-kva. motor-generators, four controllers and spare parts (Schedule 62) for Mare Island Navy Yard; motor-driven sensitive radial drill (Schedule 159), motor-driven pipe and nipple-threading machine (Schedule 73), motor-driven shear and punch (Schedule 56), four portable, multiple arc welding sets (Schedule 195); until Jan. 5, motor-driven nibbling machine (Schedule 172) for Puget Sound Navy Yard; eight 35-ton, hand-operated hydraulic presses, three 75-ton and four 5-ton similar presses (Schedule 48), nine screw-cutting lathes (Schedule 132), 10 buffing and polishing machines (Schedule 127), shearing machine (Schedule 131), automatic screw machine (Schedule 96), high-speed shaper (Schedule 125), four jig saws, four belt sanders, two tilting arbor saws, two high-speed vertical-spindle bench grinders (Schedule 200), universal horizontal milling machine (Schedule 98), all motor-driven, for Alameda, Cal., Naval air station.

La Habra Citrus Association, La Habra, Cal., will take bids soon for two-story and basement addition, 100 x 138 ft., for storage and distribution. Cost close to \$75,000 with equipment. An air-conditioning system will be installed. W. W. Ache, 301 North Citrus Avenue, Los Angeles, is architect.

◀ FOREIGN ▶

Public Works Department, Wellington, New Zealand, asks bids until Feb. 6 for motor sump pumps (Contract No. 1032); until Feb. 13 for remote control equipment (Section 47, Hamilton District); until Feb. 27, 22-kv. switchgear (Section 62, Hamilton District), 11-kv. switchgear (Section 37, Palmerston North); until March 12, switchgear and steel work (Section 27, Christchurch District).

THIS WEEK'S MACHINE ... TOOL ACTIVITIES ...

... Sales taper in many sections, preceding the holidays, and current week is expected to be dull ... Foreign buying still active ... Several big programs up in Detroit.

Tooling for Nash Line Looked for Soon

DETROIT—Culmination of plans for the Nash division of Nash-Kelvinator Corp. to introduce a light car, probably in the classification between the Willys and the Studebaker Champion, appears to have been reached. The tooling-up program is imminent. Some heavy equipment already has been ordered, but approval of the entire program is still pending. It is expected that shortly after the first of the year the plans will be completed and buying started. Buying, for the most part at least, will be done at the Nash plant in Kenosha, Wis. Meanwhile, Packard has launched an important buying program in connection with the manufacture of a diesel marine engine of large horsepower output. A minor buying program in connection with Buick engine changes is also underway. Wilcox-Rich division of the Eaton Mfg. Co. has started a building addition and modernization of its plant at Battle Creek, Mich. Plant construction work will cost approximately \$100,000 for 40,000 sq. ft. of space. Additional machinery for the manufacture of airplane parts, to cost another \$100,000, will be installed in the new space as soon as it is available. Ex-Cell-O Corp., which recently has completed a building addition at its Detroit plant, has announced plans for another 11,000 sq. ft. This will give space for additional production of machine tools and aircraft parts. Buying by Ex-Cell-O is expected to equip this extra floor space for production.

Slight Tapering in Orders Noted at Cincinnati

CINCINNATI—A slight tapering in demand is noted. This easing, however, is not as great as expected. Reports indicate that the entire list of machinery has felt in more or less degree this tendency toward a holiday reduction in retooling, so that the current business on each type is unchanged, so far as position is concerned, millers and grinders still leading the market with lathes a very close second. Drilling machinery is showing increased signs of life, while the heavy tools are still steadily in demand. Foreign business is reported to be relatively unchanged, although the question of delivery tends to retard domestic demand. Quotations are now pretty general on third quarter delivery in 1940, with isolated reports of 1941 as the earliest possible deliv-

ery date. Some coolness toward Russian business is noted in the market, but as yet this has not affected order books. Chief foreign business during the past week was from England, Canada and France.

Production schedules are still at full operation. One or two interests in the market have let work out to plants in other districts because of congestion in local factories.

Cleveland Sales Well Sustained Up to Dec. 22

CLEVELAND—Up to Dec. 22, quotations were being made at a substantial rate here and the month compared very favorably with November in sales, although below the high pressure activity 60 days earlier.

Opinion varies as to what the first quarter will bring. The question is wide open with strong arguments on both sides. It does seem likely that when France and Great Britain complete the bulk of their purchases, which they have not accomplished yet, quite a wide void will be left. The Allies are still trying to buy, however.

Local dealers assert single tool projects are numerous, undeterred by the extended delivery situation or the price factor.

Machine Tool Firms Paying Good Dividends

BOSTON—Regular quarterly and extra dividends paid by New England machine tool builders in December are the result of one of the most prosperous years experienced by them in a long time. Among those concerns to declare an extra or special disbursements were Brown & Sharpe Mfg. Co., Providence, and Manning, Maxwell & Moore. The Providence company paid a \$6 per share dividend, the second of this amount this year.

New Orders Light, Preceding Holiday Week

CHICAGO—Contrary to general impression, single general-purpose machine tools can be delivered as a rule within 90 days. Most buyers who are in need of one or two standard machines, such as lathes, radial drills, etc., believe shipment is impossible before the middle of 1940, but such is not the case generally speaking. When orders are placed either for a number of machines, or for special equipment, however, deliveries are prolonged. Actual orders in the past week were

light, the holiday season undoubtedly being of some influence. Small tool orders were slightly less than the week before. November exports of metal-working machinery were about half a million dollars less than in the previous month, a fact meaningless in itself, but one which, if continued over a few months, would have a direct effect on the domestic delivery situation.

Sales in the East Slacken As Year End Approaches

NEW YORK—With no big buying programs active at this time, sales of machine tools have slackened in the last few weeks in the metropolitan area, although the volume is still higher than the rate of activity that prevailed during the summer. Government arsenal buying is in the van now and has been for some weeks. There is also active inquiry and purchasing in connection with two small arms contracts to be let by the Government. A shell job is being figured by a railroad equipment firm. On the other hand, some sellers report a much better diversification of orders and inquiries, particularly from northern New Jersey.

The current week is expected to reflect the usual holiday lull.

CAST IRON PIPE

Public Works Commission, Spartanburg, S. C., plans pipe line extensions and replacements in water system. Fund of about \$63,000 has been secured through Federal aid for this and other waterworks installation.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., closes bids Jan. 5 for 1188 ft. of cast iron water pipe; also for valves, bends and pipe fittings (Circular 398).

Carroll Township Board, Town Hall, Frewsburg, N. Y., plans pipe lines for water system and other waterworks installation. Cost about \$100,000. Bids will be asked soon. William S. Lezier, Inc., 10 Gibbs Street, Rochester, N. Y., is consulting engineer.

Woodbury Heights, N. J., plans pipe line extensions and replacements in water system in several streets. Cost about \$116,000. Financing has been arranged through Federal aid.

New Bremen, Ohio, has authorized surveys and estimates of cost for pipe lines for water system extensions and improvements, and other waterworks installation. Champe, Finkbeiner & Associates, Nicholas Building, Toledo, Ohio, are consulting engineers.

Paris, Tex., plans pipe lines for water system and other waterworks installation. Bond issue of \$25,900 has been authorized for work.

Griffing Park, Port Arthur, Tex., has called special election Jan. 3 to approve bonds for \$35,000 for pipe line extensions and replacements in water system; also new elevated tank and tower, and other waterworks installation.

South Summit Public Water District, Pierce County, Wash., near Tacoma, Walter E. Hill, RFD 3, Tacoma, plans pipe lines for water system in district, including supply source development, pumping station, storage facilities, etc. Parker & Hill, Smith Tower Building, Seattle, consulting engineers, will make surveys and estimates of cost.

Cle Elum, Wash., plans pipe lines for water system and other waterworks installation. Cost about \$200,000. Financing is being arranged through Federal aid. Parker & Hill, Smith Tower Building, Seattle, are consulting engineers.

PRODUCTS INDEX

BILLETS—Carbon Steel
Andrews Steel Co., The, Newport, Ky.
BILLETS—Chrome Nickel Steel
Rustless Iron & Steel Corp., Baltimore, Md.
BILLETS—Chrome Steel
Rustless Iron & Steel Corp., Baltimore, Md.
BILLETS—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Republic Steel Corp., Cleveland, Ohio.

BILLETS—Re-rolling
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.

BILLETS—Steel
Bethlehem (Pa.) Steel Company.
Continental Steel Corp., Kokomo, Ind.
Harrisburg (Pa.) Steel Corp.
Jones & Laughlin Steel Corp., Pittsburgh.
Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BLANKS—Chisel
Cleveland (Ohio) Punch & Shear Works Co., The.
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

BLANKS—Gear, Silent Steel
Waldron, John, Corp., New Brunswick, N. J.

BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

BLAST FURNACES
Brassett, H. A. & Co., Chicago, Ill.

BLAST GATES
Rockwell, W. S. Co., 50 Church St., N.Y.C.
BLOCKS—Chain
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

BLOWERS
American Blower Corp., 6000 Russell St., Detroit.
Buffalo (N. Y.) Forge Co., 492 Broadway.

BLOWPIPES—Oxy-Acetylene Welding & Cutting
Linde Air Products Company, The, 80 East 42nd St., N. Y. C.

BLOWPIPES—Soldering, Heating, Annealing
American Gas Furnace Co., Elizabeth, N. J.

BOILERS—Waste Heat
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BOILERS—Water Tube
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BOLT CUTTERS
Landis Mch. Co., Inc., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.

BOLT AND NUT MACHINERY
Ajax Mfg. Co., The, Cleveland, Ohio.
Landis Machine Co., Inc., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

BOLT & RIVET CLIPPERS
Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine
Cleveland (Ohio) Cap Screw Co., The.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.
Trinlex Screw Co., Cleveland.

BOLTS—Special
Cleveland (Ohio) Cap Screw Co., The.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Stove
Progressive Mfg. Co., Torrington, Conn.

BOLTS—Stove, Resealed Head
American Screw Co., Providence, R. I.

BOLTS—Track
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BOLTS AND NUTS
American Screw Co., Providence, R. I.
Clark Bros. Bolt Co., Milldale, Conn.
Cleveland (Ohio) Cap Screw Co., The.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.
Trinlex Screw Co., Cleveland.

BOND—Grinding Wheel
Bakelite Corp., 247 Park Ave., New York City.

BORING BARS
Bullard Co., The, Bridgeport, Conn.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Gairing Tool Co., The, Detroit.
Gisholt Machine Co., Madison, Wisconsin.

BORING, DRILLING & MILLING MACHINES—Horizontal
Giddings & Lewis Machine Tool Co., Fond Du Lac, Wis.

Hill-Clarke Mch. Co., 647 W. Washington Blvd., Chicago.
Lucas Machine Tool Co., Cleveland.
National Automatic Tool Co., Richmond, Ind.

BORING & DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, Ohio.
Bullard Co., The, Bridgeport, Conn.

BORING MACHINES—Diamond & Carbide Tools
Heald Machine Co., Worcester, Mass.

BORING MACHINES—Jig
Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn.

BORING MACHINES—Precision
Cimatool Co., The, Dayton, Ohio.

BORING & TURNING MILLS—Vertical
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Planer Co.

BRAKE LINING & BLOCKS—Asbestos
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BRAKES—Electric
Clark Controller Co., The, Cleveland.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
Kiekhaefer Corp., Cedarburg, Wis.

BRAKES—Electric & Mechanical
Clark Controller Co., The, Cleveland.
Electric Controller & Mfg. Co., The, Cleveland.

BRAKES—Magnetic
Kiekhaefer Corp., Cedarburg, Wis.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

BRAKES—Metal Forming
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co., The.
Steelweld Machinery Div., Wickliffe, Ohio.

Drels & Krump Mfg. Co., Chicago.
Ferracute Machine Co., Bridgeton, N. J.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BRICK—Fire Clay
Carborundum Co., The, Niagara Falls, N. Y.
Illinois Clay Products Co., Joliet, Ill.

BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BRIDGE BUILDERS
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia.

BRIDGE OPERATING MACHINERY—Movable
Carle Gear & Mch. Co., Philadelphia.

BRICKQUETS—Ferrolloy
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

BROACHES
Colonial Broach Co., Detroit.

BROACHING MACHINES
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Milling Mch. Co., The.
Colonial Broach Co., Detroit.
Lucas Machine Tool Co., Cleveland.
Olgear Co., The, 1311 W. Bruce St., Milwaukee.

BRONZE FOR DIES
Ampeco Metal, Inc., Milwaukee, Wis.

BRONZE—Phosphor
Bunting Brass & Bronze Co., Toledo, Ohio.

BRUSHES—Machine
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BRUSHES—Wire
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BUCKETS—Clamshell
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh, Pa.

Cullen-Friedstedt Co., 1303 S. Kilbourn Ave., Chicago.

Hayward Co., The, 50 Church St., N. Y. C.
Hevl & Patterson, Inc., Pittsburgh.
Industrial Brownhols Corp., Bay City, Mich.

Wellman Engineering Co., The, Cleveland.

BUCKETS—Electric Motor
Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Orange Peel
Hayward Co., The, 50 Church St., N. Y. C.

BUFFERS & POLISHING MACHINES
Packer Machine Co., The, Meriden, Conn.

BUFFING APPLICATORS—Automatic
Packer Machine Co., The, Meriden, Conn.

BUFFING COMPOUND—Stainless & Other Steels
Harrison & Co., Haverhill, Mass.

BUILDINGS—Steel
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

American Rolling Mill Co., Middletown, Ohio.
Belmont Iron Works, Philadelphia.
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh, Pa.

Iron & Steel Products, Inc., Chicago.

BULLDOZERS
Ajax Mfg. Co., The, Cleveland, Ohio.
Cleveland Crane & Engineering Co., The.
Steelweld Machinery Div., Wickliffe, Ohio.

JUST BETWEEN US TWO

Goodbye . . . Hello

With the decade on its last legs, this is a good time to finger our scars and count our medals. Ten years ago this month it was believed that the incredible era had just halted temporarily for a breather. Spring, our best minds assured us, would once more see the trend lines climbing like a human spider up the face of the Fisher Building.

Labor Day was the corner prosperity was just around . . . then Jan. 1 . . . Spring . . . Labor Day again. But three dismal years were to pass before the patient said, "Gimme my pants. I'm getting out of here."

Never one to spare itself while others suffered, your favorite family journal grew gaunt along with the rest. Its family of more or less happy readers shrunk. There was barely enough room on the backbone to print the issue date.

But that was years ago. The close of the decade finds the family once more full strength and advertising burgeoning like the dust belt in a wet summer.

To usher in the new decade fittingly, next week's issue—the Annual Number—will be one of the finest we have ever published. The editors have been celebrating in overdrive for the past several months just for the pleasure of hearing you say, "Ain't it a beaut!"

Curiosa

The catholicity of interest in the art of fabricating and heat treating metals is attested by the list of those who attended the last National Metals Exposition. Among the tens of thousands of visitors were H. Lefkovich of Herman's Food Shop, Chicago; William Foster of the Flossy Dental Co., same city, and H. G. Wright, Grand Secretary-Treasurer of Delta Sigma Phi.

The gentleman with the most unusual title is Clayton J. Bickler of the Elgin Watch Co., Elgin, Ill. Mr. Bickler lists himself as "General Jobmaster." But what heats our curiosity above its low melting point is the company connection given by Charles V. Meeker. He said he is connected with "The Hot Spot," of Peru, Ind.

Bronx Cheer of Yesteryear

Homer Martin's article last week mentioned something having been said with "tongue in cheek." We have never seen this done, and have longed for years to see an expert tongue-in-cheeker in action. Perhaps some world travelers among our 18 loyal readers can tell us whether just a single cheek is distended, or whether the tongue is rapidly reciprocated to produce a double distension.

Warning

Last August a man representing himself as an agent of the "Western Publishers Service Corp." called on a Los Angeles subscriber and collected \$10 for a three-year subscription for *The Iron Age*.

We have no cut rates. The U. S. price is \$6 a year straight. We never heard of the "Western Publishers Service Corp." The money hasn't reached us. We are beginning to get suspicious.

Tops—With Exceptions

Getting in one last sting before the year ends, McC., the anonymous gadfly, breaks a lance for our advertiser, the *Satevepost* (see page 99 of last week's issue):

"You describe me as acidulous. The word is assiduous.

When a publication like the S.E.P. speaks of a magazine, it most likely has in mind its competitors in the general, popular field, and not trade papers."

Most likely McC. is right. In fact the *Satevepost* wrote us to the same effect. But we are proud of the unqualified boast, "The Iron Age carries more advertising than any other publication in the world," and will continue to snarl at infringers.

Puzzle

While waiting for your New Year's hangover to wear off, you might toy with this, lifted from *The Reporter*:

A man has a lot 400 ft. long and 200 feet wide. He wishes to construct a concrete walk 3 ft. wide, diagonally across the lot from opposite corners, the opposite diagonal corners of the walk intersecting with the opposite diagonal corners of the lot. What will be the area of the ground covered by the walk?

—A.H.D.

PRODUCTS INDEX

BURNERS—Oil or Gas
American Gas Furnace Co., Elizabeth, N. J.

BURNISHING COMPOUNDS
Magnus Chemical Co., 46 South Ave., Garwood, N. J.

BURNISHING MACHINES—Gear
Cimatool Co., The, Dayton, Ohio.

BURNING MACHINES
Cimatool Co., The, Dayton, Ohio.

BUSHINGS—Bronze
Ameco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Shenango-Penn Mold Co., Dover, Ohio.

BUSHINGS—Diless
Rhoades, R. W., Metairie Co., Inc., Long Island City, N. Y.

BUSHINGS—Phosphor Bronze
Bunting Brass & Bronze Co., Toledo, Ohio.

BY-PRODUCTS COKE AND GAS PLANTS
Koppers Co., Engineering & Construction Div., Pittsburgh.

CABINETS—Tool & Parts
Standard Steel Products Co., Poughkeepsie, N. Y.

CABLE—Electric
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Cleveland.

CABLEWAYS AND TRAMWAYS—See
Tramways

CALCIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CARBIC
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE—Boron
Norton Co., Worcester, Mass.

CARBIDES—Cemented
Carboly Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.

CARBURIZING—See Heat Treating

CARS—Railway
Iron & Steel Products, Inc., Chicago.

CARS—Industrial and Mining
Atlas Car & Mfg. Co., The, Cleveland.
Heyl & Patterson, Inc., Pittsburgh.

CASE HARDENING—See Heat Treating

CASTERS
Darnell Corp., Ltd., Long Beach, Calif.

CASTINGS—Acid or Heat Resisting
Ameco Metal, Inc., Milwaukee, Wis.
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Alloy Iron
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Alloy Steel
Advance Foundry Co., The, Dayton, Ohio.
Detroit (Mich.) Alloy Steel Co.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Michigan Products Corp., Michigan City, Ind.

CASTINGS—Aluminum
Aluminum Co. of America, Pittsburgh.

CASTINGS—Brass, Bronze, Copper or Aluminum
Bunting Brass & Bronze Co., The, Toledo, Ohio.

CASTINGS—Bronze
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Carbide
National Bearing Metals Corp., Pittsburgh.
Shenango-Penn Mold Co., Dover, Ohio.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—Corrosion Resisting
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Die
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS—Electric Steel
Continental Roll & Steel Foundry Co., East Chicago, Ind.

CASTINGS—Flame Retardant
Crucible Steel Castings Co., Lansdowne, Pa.
Detroit (Mich.) Alloy Steel Co.
Lebanon (Pa.) Steel Foundry.

CASTINGS—High Test & Alloy Iron
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.

CASTINGS—Malleable
Canton (Ohio) Malleable Iron Co., The, Lakeside Ave., Cleveland.
Northern Malleable Iron Co., St. Paul, Minn.
Peoria (Ill.) Malleable Castings Co.

CASTINGS—Manganese, Steel and Alloy
Petitbone Mulliken Corp., Chicago.

CASTINGS—Mechanite Metal
Parrel-Birmingham Co., Inc., Ansonia, Conn.

CASTINGS—Monel & Nickel
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Semi-Steel
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Steel
American Rolling Mill Co., Middletown, Ohio.
Bethlehem (Pa.) Steel Company.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Roll & Steel Foundry Co., East Chicago, Ind.
Crucible Steel Castings Co., Lansdowne, Pa.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mesta Mch. Co., Pittsburgh.
Michigan Products Corp., Michigan City, Ind.

CASTINGS—Tool & Parts
Standard Steel Products Co., Poughkeepsie, N. Y.

CASTINGS—Wrought Iron
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Zinc
Zinc Foundry Co., The, Dayton, Ohio.

CASTINGS—Zinc Alloy
Zinc Foundry Co., The, Dayton, Ohio.

CASTINGS—Zinc Die Cast
Zinc Foundry Co., The, Dayton, Ohio.

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Zinc Foundry Co., The, Dayton, Ohio.

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Zinc Foundry Co., The, Dayton, Ohio.

CASTINGS—Zinc Die Cast
Zinc Foundry Co., The, Dayton, Ohio.

CHEMICALS—Industrial
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—Rust Proofing
Alroese Chemical Co., Cranston, Providence, R. I.

CHEMICALS—Rust Proofing
Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHROMIUM — Plating — See Plating — Chromium

CHRONOGRAPH
Stillman, M. J., Co., Inc., Chicago.

CHUCKING MACHINES—Automatic
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

CHUCKING MACHINES—Multiple
Baird Mch. Co., The, Bridgeport, Conn.
Goss & DeLew Machine Co., New Britain, Conn.

CHUCKS—Drill
Cleveland (Ohio) Twist Drill Co., The, Millers Falls Co., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

CHUCKS—Magnetic
Brown & Sharpe Mfg. Co., Providence, R. I.

CHUCKS—Magnetic
Heald Machine Co., Worcester, Mass.
Taft-Petree Mfg. Co., The, Woonsocket, R. I.

CLAMPS—Cable Strain
Efficiency Electric & Mfg. Co., East Palestine, Ohio.

CLAMPS—Rail Booster
Efficiency Electric & Mfg. Co., East Palestine, Ohio.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Ford, J. B., Sales Co., The, Wyandotte, Mich.

CLEANERS—Metal
Magnus Chemical Co., 46 South Ave., Garwood, N. J.

CLEANING EQUIPMENT (METAL)—Electro-Chemical
Bullard Co., The, Bridgeport, Conn.

CLUTCH-BRAKES—Magnetic
Kiekhafer Corp., Cedarburg, Wis.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES
Falls Clutch & Mch. Co., The, Cuyahoga Falls, Ohio.

CLUTCHES
Foote Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.

CLUTCHES
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, N. Y.

CLUTCHES—Friction
Dodge Mfg. Corp., Mishawaka, Ind.

CLUTCHES—Friction
Twain Disc Clutch Co., Racine, Wis.

CLUTCHES—Magnetic
Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., 727 Smith St., Milwaukee.

CLUTCHES—Magnetic
Kiekhafer Corp., Cedarburg, Wis.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

COAL
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.

COAL
Koppers Coal Co., The, Pittsburgh.

COAL
Oglebay, Norton & Co., Cleveland.

COAL
Pickands Mather & Co., Cleveland.

COAL
Schulze-Nord, Kallaevskaja Ulitsa 5, Moscow 6, U. S. S. R.

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COAL ORE & ASH HANDLING MACHINERY
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

COBALT METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.

COILS—Lead
National Lead Co., 111 Bdw., N. Y. C.

COILS—Pipe
Harrisburg (Pa.) Steel Corp.

COKE—Metallurgical
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.

COKE—Metallurgical
Pickands Mather & Co., Cleveland.

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., The, Cleveland.

COKE OVEN MACHINERY
Koppers Co., Engineering & Construction Div., Pittsburgh.

COMPOUNDS—Drawing and Cutting
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.

COMPOUNDS—Drawing and Cutting
Magnus Chemical Co., 46 South Ave., Garwood, N. J.

COMPOUNDS—Drawing and Cutting
Penola, Inc., Pittsburgh.

COMPOUNDS—Drawing and Cutting
Standard Oil Co. (Indiana), Chicago.

COMPOUNDS—Drawing and Cutting
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

COMPRESSORS—Air
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.

COMPRESSORS—Air
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

COMPRESSORS—Air
Worthington Pump & Machinery Corp., Harrison, N. J.

COMPRESSORS—Gas
Worthington Pump & Machinery Corp., Harrison, N. J.

COMPRESSORS—Rebuilt. (See Clearing House Section)

CONDENSERS—Surface & Jet
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CONDENSERS—Surface & Jet
Worthington Pump & Machinery Corp., Harrison, N. J.

CONTACTS—Electrical
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

CONTRACTORS' SUPPLIES — Second-Hand. (See Clearing House Section)

CONTROL SYSTEMS—Temperature
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

CONTROLLERS—Crane
Clark Controller Co., The, Cleveland.

CONTROLLERS—Crane
Cutler-Hammer, Inc., Milwaukee.

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Electric Controller & Mfg. Co., The, Cleveland.

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CONTROLLERS—Electric
Cutler-Hammer, Inc., Milwaukee.

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Electric Controller & Mfg. Co., The, Cleveland.

CONTROLLERS—Electric
General Electric Co., Schenectady, N. Y.

CONTROLLERS—Valve, Electrically Operated
Brown Instrument Co., The, Philadelphia.

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Koppers Co., Bartlett Hayward Div., Baltimore, Md.

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Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

CONVEYORS—Monorail
American Monorail Co., The, Cleveland.

CONVEYORS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

CONVEYORS—Portable
Farquhar, A. B., Co., Ltd., York, Pa.

COPING MACHINES
Cleveland (Ohio) Punch & Shear Works Co., The.

COPING MACHINES
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

CORE OIL
Penola, Inc., Pittsburgh.

CORE OIL
Sun Oil Co., Philadelphia.

CORE OIL
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS — See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.

DECEMBER 28, 1939

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THE

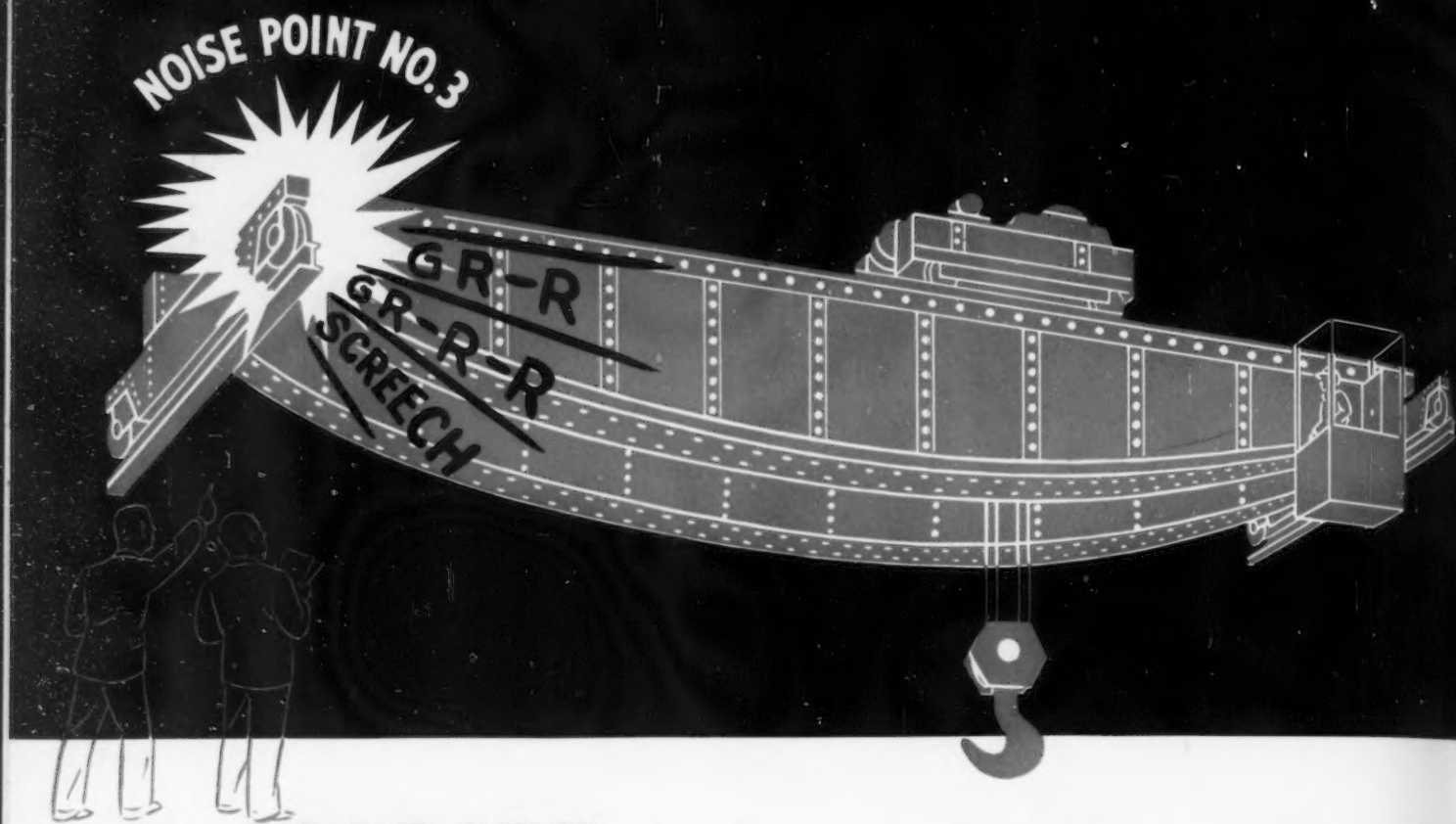
DEC 28 1939

IRON AGE



Season's Greetings

*Ohio Ferro-Alloys Corporation
Canton, Ohio*



This **NOISE** in your bridge wheels means **WEAR!**

In a crane, every "noise point" is a "wear point." If your cranes are noisy, sooner or later you'll be confronted with expensive maintenance, replacements, and shutdowns.

Whiting cranes operate quietly, with less wear. They are equipped with smooth-running herringbone gears. Anti-friction roller bearings keep gears in permanent alignment. Flexible couplings transmit motor power without binding. These and other features make the Whiting crane so trouble-free. Whiting Corporation, 15601 Lathrop Avenue, Harvey, Ill. In Canada: Whiting Corporation (Canada) Ltd., Toronto.

Builders of quality cranes for over 50 years.

Tapered Tread Drive Wheels Reduce Noise and Wear in Whiting Cranes

At Noise Point No. 3—the bridge trucks—drive wheels are provided with tapered treads, machined to exact dimensions. These tapered-tread wheels advance both bridge trucks uniformly along the runway and eliminate binding of the flange against the rail. Wheels and rails last longer, and the load on the bridge motor and drive is reduced. Roller bearings add further to the freedom and ease of crane travel.



**CAPACITIES
1 TO 400 TONS**



HOW TO WRITE a Traveling Crane Specification

Contains a discussion of the important factors in crane design and complete information on how to specify an overhead traveling crane to fit your individual needs. Will be sent to all production executives on request.

IT PAYS TO GET A QUOTATION ON

WHITING

OVERHEAD TRAVELING CRANES

PURPLE-STRAND *FORM-SET* WIRE ROPE



Made of premium-price extra-tough steel

EVERY pound of steel that goes into Purple-Strand rope would command an extra price on the open market, for extra care and extra time are required in steel-making departments to produce this metal. Special furnaces, reserved for the out-of-ordinary job, are used. Special practices, carried out under strict metallurgical observation, are observed at these furnaces, at the soaking pits, and in the rolling mills.

The result is a superior steel, the first requirement for superior rope. This steel, drawn into wire, has more than four times the strength of structural steel. It has a toughness far exceeding any ordinary steel. Its fatigue resistance is exceptional. And above all, because of close control and a strict schedule of testing, these qualities are the same in mile after mile of wire.

Purple-Strand quality, however, does not end with the premium-price steel. Every step in the making of a Purple-Strand wire rope involves extra skill and attention. For example, design has been perfected until this line is a real precision machine. Lubrication has been studied and special lubricants developed. Every conceivable step has been taken to make Purple-Strand Form-Set the finest wire rope money can buy.

Bethlehem wire rope is available through distributors. Write Bethlehem Steel Company, Bethlehem, Pa., for the names of wire-rope distributors in your vicinity.

BETHLEHEM STEEL COMPANY



THE IRON AGE, December 28, 1939—3

THE IRON AGE, published every Thursday by the CHILTON CO. (INC.). Publication office, Chestnut & 56th Sts., Philadelphia, Pa. Editorial and Executive Offices, 239 W. 39th St., New York, N. Y. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. \$6.00 a year in U. S., Canada \$8.50, Foreign \$12.00. Vol. 144, No. 26.



GOOD OIL SEAL PROTECTION is a break for both machine and operator



● The conscientious machine operator is always glad to get a machine with adequate oil seal bearing protection. With such a machine he does not have any unsightly oil leaks with which to contend. As a result he does more and better work.

The machine operator also knows just how often bearings have to be lubricated. With good oil seal protection he can be sure that these bearings retain an adequate supply between the times when they are lubricated.

If the product being turned out is one that would be spoiled by lubricant leakage, oil seals give him further protection.

Give the men who will operate the machines you manufacture a break by equipping them with "Perfect" Oil Seals—the best protection available. Write for technical information.

CHICAGO RAWHIDE MANUFACTURING CO.
1306 ELSTON AVENUE, CHICAGO, ILLINOIS
61 Years Manufacturing Quality Mechanical Leather Goods Exclusively

PHILADELPHIA

NEW YORK

BOSTON

CLEVELAND

DETROIT

PITTSBURGH

CINCINNATI

SLOW DOWN ROPE WEAR!



A wire rope that reduces rope wear to a minimum—that provides maximum resistance against fatigue—Roebling "Blue Center" assures maximum rope operating economy. It is the highest achievement of Roebling's over 90 years of rope making experience! Ask about this rope—either standard or preformed.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N.J.
BRANCHES IN PRINCIPAL CITIES

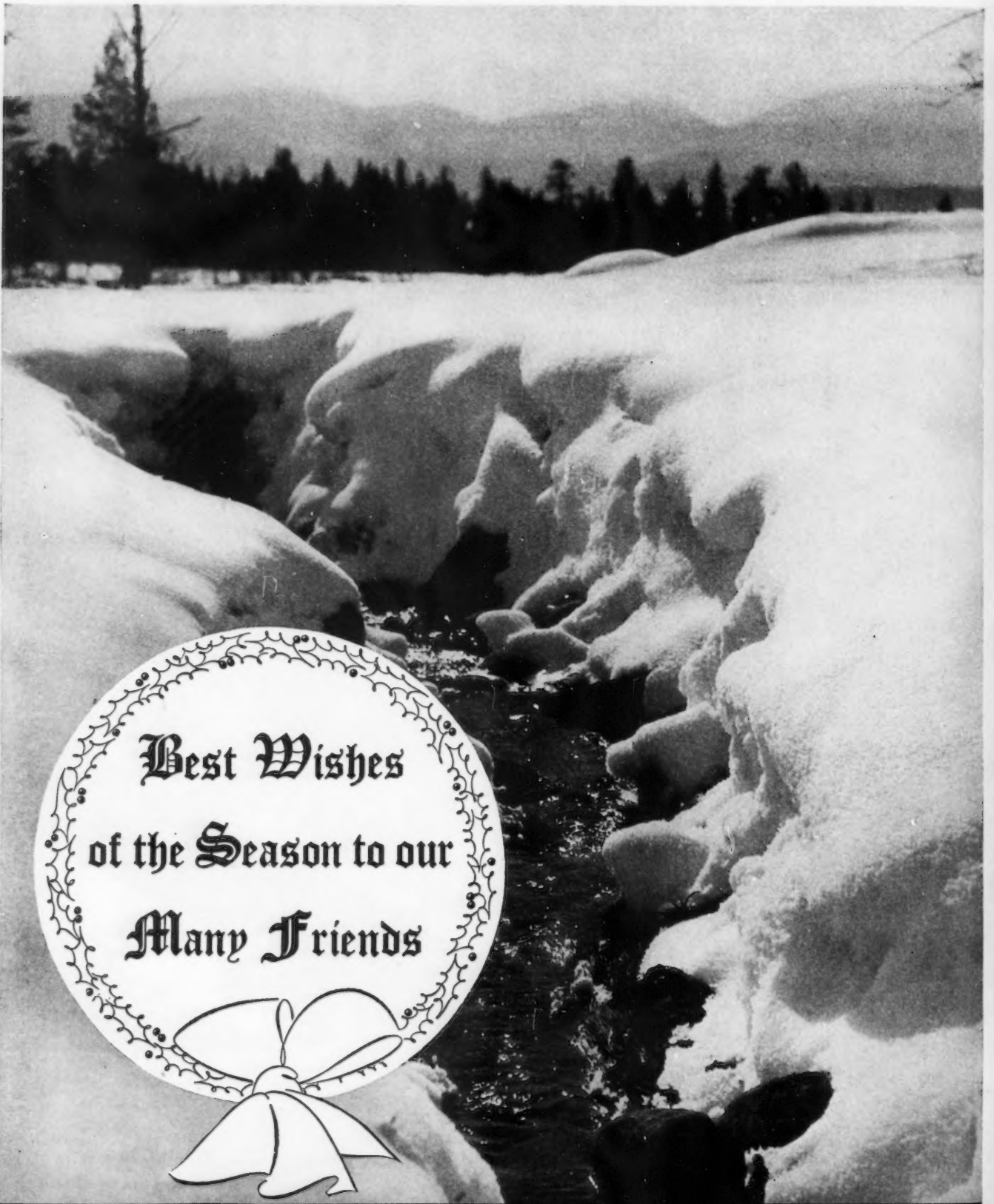
STRONGER—Wire of highest strength consistent with ductility and toughness

TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

SAFER—Unequaled for uniformity of quality

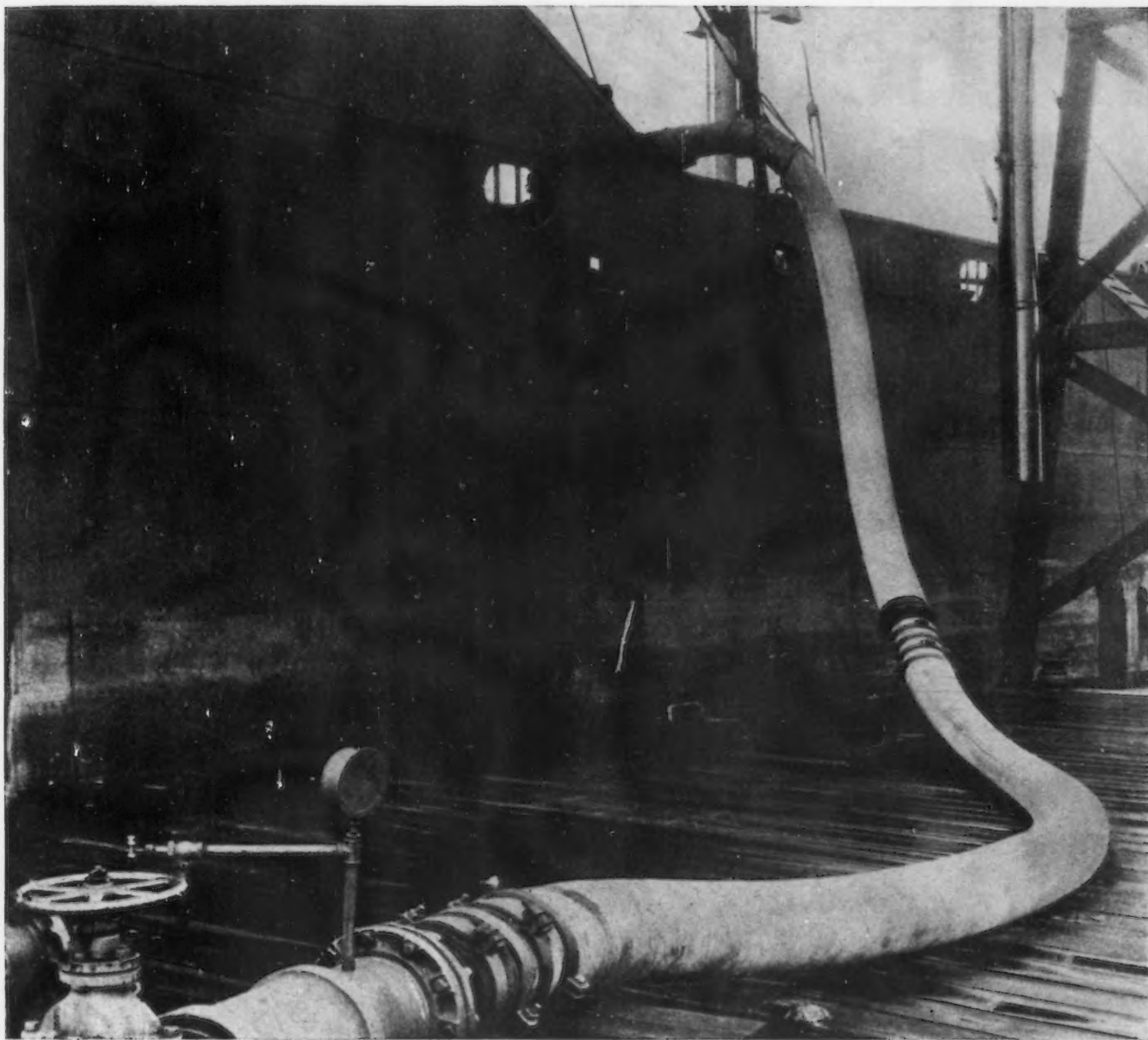
SAVING—Insures lowest general average operating cost

THE HIGHEST DEVELOPMENT IN ROEBLING WIRE ROPE



THE BALDWIN GROUP

THE BALDWIN LOCOMOTIVE WORKS • BALDWIN-SOUTHWARK CORPORATION
• CRAMP BRASS AND IRON FOUNDRIES COMPANY • DE LA VERGNE ENGINE
COMPANY • THE MIDVALE COMPANY • THE PELTON WATER WHEEL COMPANY •
STANDARD STEEL WORKS COMPANY • THE WHITCOMB LOCOMOTIVE COMPANY



Rubber rushes "molasses in January"

A typical example of Goodrich development in rubber

IT TAKES a lot of molasses to make all the gingerbread, cookies (and industrial alcohol) America demands. Although cheap to produce, molasses used to be a problem to transport.

Some ingenious soul thought of shipping it by water, in tankers. But how to load the tankers? Pumping through hose would be the quickest way but no ordinary hose would do . . . it would have to be of enormous size; have to withstand yanking up ship side and hanging by chains without collapse; have to stand high pumping pressures, rough handling on docks.

Goodrich was consulted. They had already developed a special type of hose, ingeniously armored with steel rings in the hose wall, strong enough to hold the pressures needed to drive the rushing, seething molasses at high speed. This hose was tried . . . it was a complete success. Now a tanker can be loaded with 3 million gallons of molasses in a few hours, cost is low so that gingerbread and alcohol aren't expensive, and the tough hose stands up under its hard work for years without repairs or maintenance.

Next time you have some problem with your product or process, to which

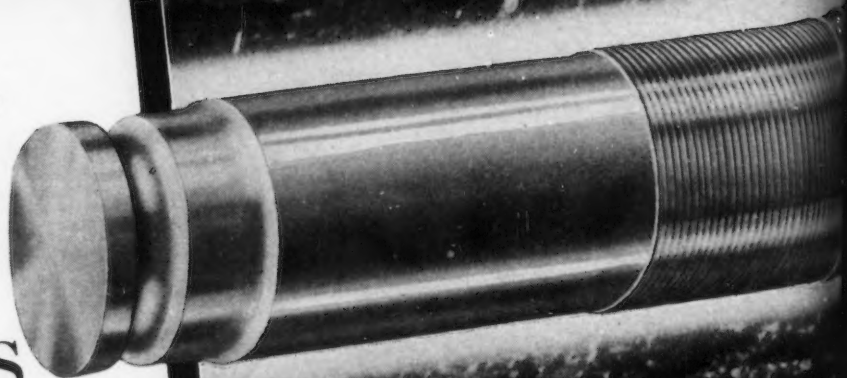
rubber might be the answer, find out what Goodrich engineers know about it. Hundreds of times these intensely practical men have done what seemed to be the impossible in cutting costs, improving products. To get the benefit of their experience in belting, hose and many other products you have only to call your Goodrich Distributor. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich
ALL products problems IN RUBBER

In the *Vital Parts*




U.S.S. CARILLOY
dependable
ALLOY STEELS



of a Record Breaker

Equipped with tough axles of U·S·S Carilloy Steel . . . monster scrapers move more yards per trip, per hour, per dollar



ON this big job contractor's profits depended entirely on cutting dirt-moving costs. To strip the dam site, the outlet works and dikes for the Prado Dam, Santa Ana River, California, 4½ million yards of earth had to be moved—and moved fast.


A fleet of 25-cu. yd. ultra-modern scrapers was put to work. Each rig completed the 2700-foot average round trip 7.5 times, moved 150 yards every hour. Loading time 1 minute 25 seconds. Fuel consumption, 35 gals. of Diesel fuel per 8-hour shift, better than 34 yards per gallon.

But speed was not the only essential in this work. Equally important were *stamina* and *dependability* in every part of the equipment. U·S·S Carilloy Alloy Steel—S.A.E. 4140—used in the axles which bear the brunt

of the load, assures a wide margin of strength and safety in these vital parts.

In U·S·S Carilloy Alloy Steels we offer you dependable, highest quality alloy steels that assure the utmost dependability in the parts made from them. These made-to-measure steels are produced by specialists who make fine alloy steels and nothing else—and whose aim is to give you the exact grade of steel that will do the best job for you at lowest cost. We welcome the opportunity to put our whole story before you.

(Shown below, axle for 25-yd. unit.) Wooldridge "Terra-Clippers" are built in nine sizes from 4 to 25-yard capacity, in all of which U·S·S Carilloy Alloy Steel—S.A.E. 4140—is used for the axles. U·S·S Carilloy Alloy Steel—S.A.E. 4140—is also used for the shaft of gears in the power control unit and in heat-treated form, is used in the axles of the ripper as well as in the ripper standards. Illustrations, courtesy of the Wooldridge Co., Sunnyvale, California.



CARNEGIE-ILLINOIS STEEL CORPORATION

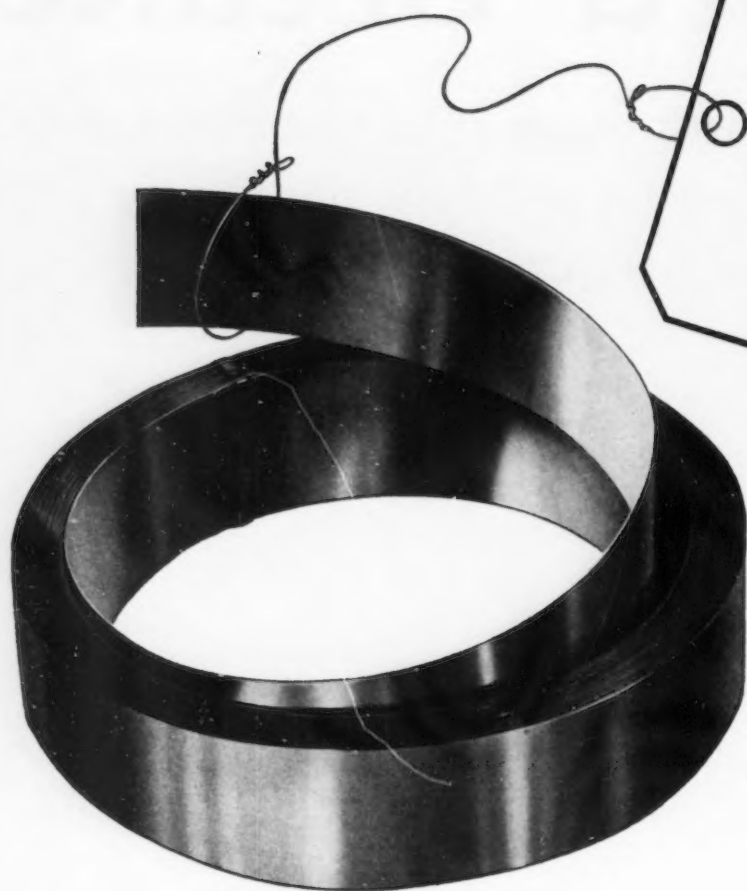
Pittsburgh and Chicago

Columbia Steel Company, San Francisco,
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Export Distributors



UNITED STATES STEEL



IT'S **ROEBLING**
COLD ROLLED
HIGH CARBON STEEL
FLAT WIRE

HARD-TO-PLEASE USERS
SATISFY THEIR SEVEREST REQUIREMENTS
AT ROEBLING!



Specialists IN PRODUCING FLAT WIRE TO MEET EXACTING "SPECS"!

If you are interested in this advertisement—you are what we call a "critical" buyer of cold-rolled high or low carbon steel flat wire. By "critical", we mean that you order your flat wire to exacting specifications—and insist on having them met.

We specialize in making flat wire for such discriminating users. And we make it to hundreds of varying specifications, calling for qualities such as high fatigue resistance, great flexibility and resiliency, high tensile strength, exceptionally uniform temper, and so forth.

If you require high quality flat wire of this type, we would welcome an opportunity to serve you. For a number of reasons, we are exceptionally well equipped to produce this product. First, we produce the special steels required, in our own mill. Secondly, we have special facilities and equipment to turn out these difficult "flats", on a careful, custom-made basis. Third, we are in a position to give this business the time and attention it requires. Fourth, our specialized experience covers a period of over 40 years.

We invite your inquiry for further information, samples or prices.

TYPES:—Roebling Cold Rolled Flat Wire is made from both high carbon and low carbon steels, produced in Roebling's own mills. The high carbon flat wire is available in tempered and untempered types.

FINISHES:—bright, black annealed, bright annealed, tinned, japanned, galvanized, blued, straw-colored, and coppered.



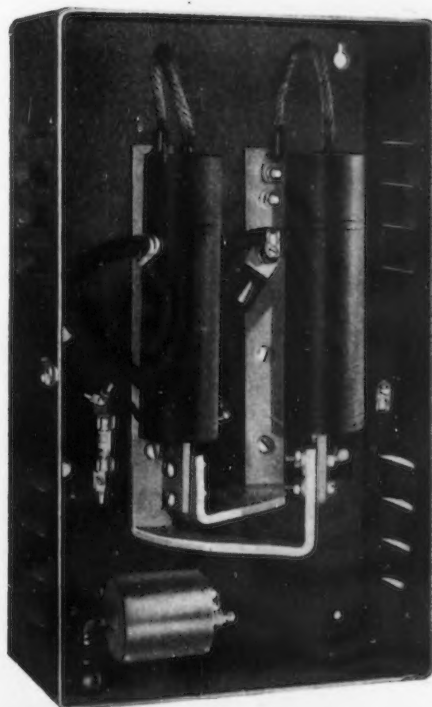
JOHN A. ROEBLING'S SONS COMPANY
Trenton, N.J. Branches in Principal Cities

COLD ROLLED STEEL FLAT WIRE—TO MEET EXACTING REQUIREMENTS

SAVES



FOR USERS OF RESISTANCE WELDING



Are you interested in cutting your maintenance costs for resistance welding? Take a minute or two to tear out the coupon below, fill in your name and address and mail it to Westinghouse.

This will bring you the facts about Weld-o-trol ...the new type of control for resistance welders.

It is quiet . . . has no moving parts to wear out . . . prolongs electrode tip life . . . reduces outages . . . saves maintenance expense . . . and may be used with present timing equipment. Weld-o-trol will make and break the welding circuit 600 times a minute or more . . . and it will do this accurately and uniformly.

A minute or two to fill in the coupon will start the proof on the way to you. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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(Company)

(Address)

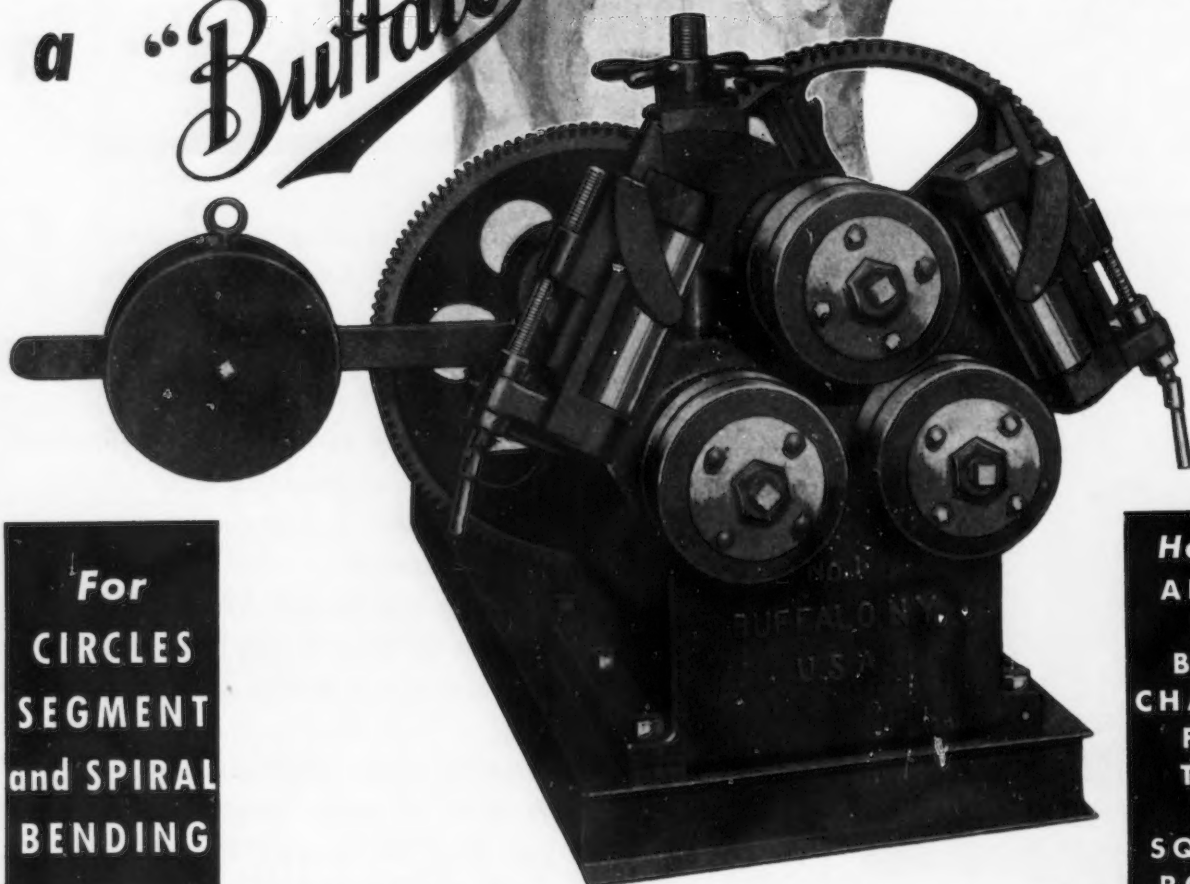
(City and Town)


Westinghouse

Weld-O-Trol

The "STRONG MAN" for Your Bending Work

a "Buffalo" BENDING ROLL



**For
CIRCLES
SEGMENT
and SPIRAL
BENDING**

**Handles
ANGLES
TEES
BEAMS
CHANNELS
FLATS
TUBES
PIPE
SQUARES
ROUNDS
RAILS**

Some iron working shops are still trying to "get along" with old fashioned sledge hammer bending methods—slow, laborious, costly and not too accurate. Others, and the number is increasing rapidly, are installing Buffalo

Bending Rolls because these modern "Strong Men" soon pay their cost in better, faster work at a greatly reduced cost per piece.

Write today for latest bulletin No. 352.

BUFFALO FORGE COMPANY

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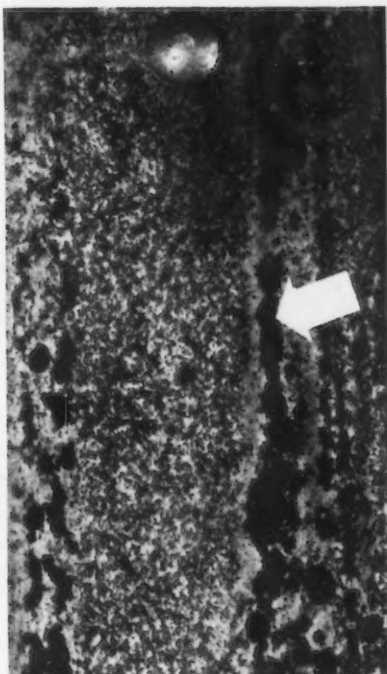
Canadian Blower & Forge Co., Ltd.

Buffalo, N. Y.

Kitchener, Ont.

Use this IMPROVED SLUSHING COMPOUND

to protect highly finished metal surfaces



*Look at
the
Difference!*

These two similar pieces of metal, one slushed with GULF OILCOAT NO. 1 and the other with a conventional slushing compound, were exposed to highly corrosive influences for the same length of time. The superior value of GULF OILCOAT NO. 1 is clearly demonstrated by the perfect condition of the metal plate on the left.

**GULF OILCOAT NO. 1 is easily applied,
long lasting and economical to use**

YOU can now secure an improved material to protect highly finished surfaces of steel and non-ferrous metal products against corrosion—GULF OILCOAT NO. 1. This product is an entirely new type of slushing compound, developed by Gulf technologists after many years of research and field tests.

While GULF OILCOAT NO. 1 provides a thin film which is not easily rubbed off by handling, it may be readily removed by conventional solvents.

Accelerated laboratory corrosion tests, as well as field tests with all types of metals have established the superiority of this new type of slushing material over products formerly used for this purpose.

GULF OILCOAT NO. 1 can be applied by any conventional method and lasts for a long period of time. It is nominally priced and economical to use. Ask the Gulf representative who calls on you to give you further details—or fill in and mail the coupon below for complete information.



FILL IN AND MAIL THIS COUPON

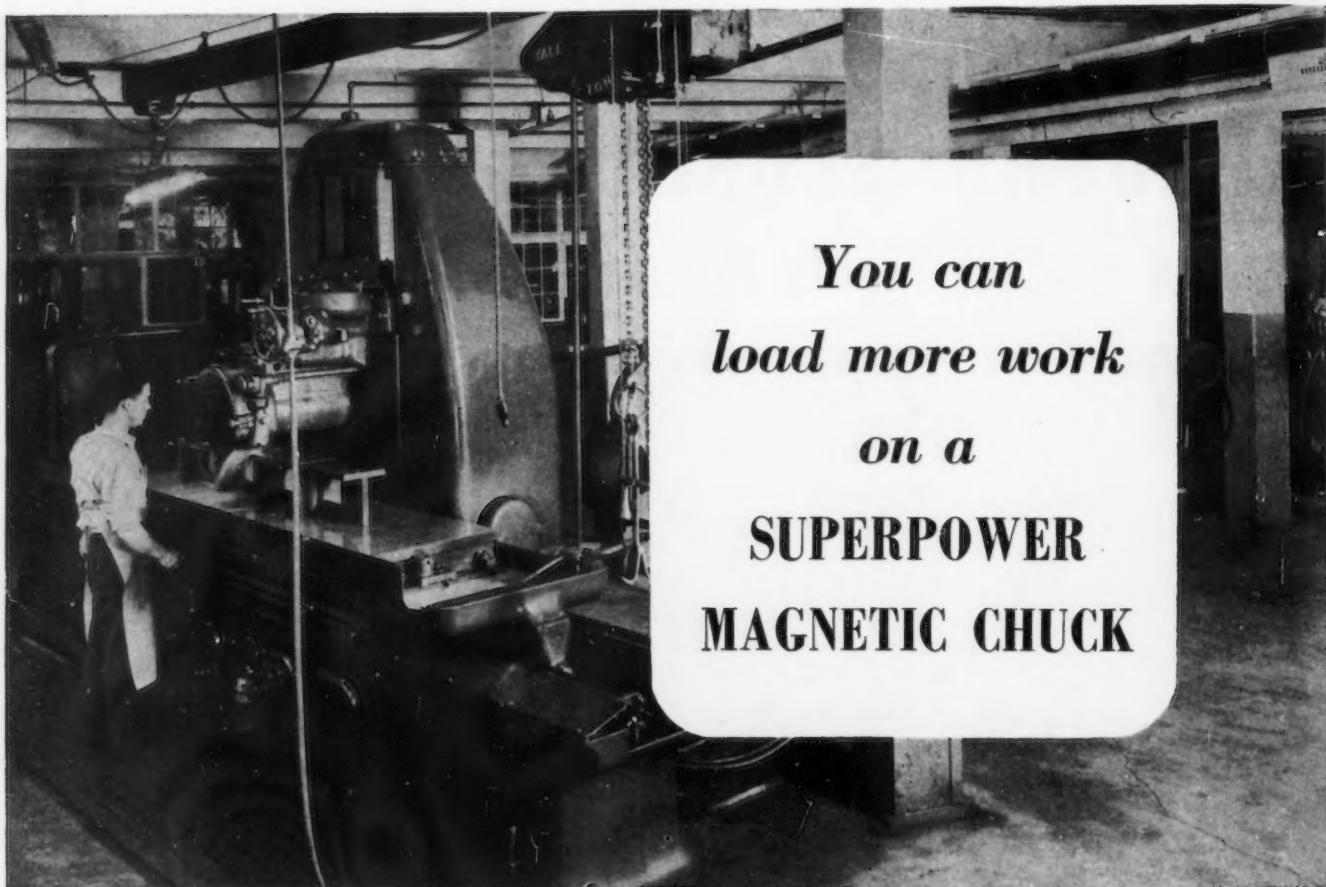
Gulf Oil Corporation—Gulf Refining Company
Room 3813, Gulf Building, Pittsburgh, Pa.

Please send me complete information and price quotations on GULF OILCOAT NO. 1.

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Company

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*You can
load more work
on a*
**SUPERPOWER
MAGNETIC CHUCK**

THERE'S a much more powerful *pull*, over a much greater active area. And that means *extra holding power* to handle today's high speeds and heavy feeds.

Extra machine-capacity, too, is provided by Superpower's maximum clearance under wheel or tool. And the fine-mesh faceplate (when ordered) handles smaller pieces . . . as for instance, 4000 small washers per load. Also, work-range can be extended to irregular-shaped

parts by use of Taft-Peirce Magnetic V-Blocks and Parallels (*see the T-P Handbook*).

No other magnetic chuck approaches these advantages . . . or matches the heavy-duty, waterproof durability of Superpower. It will cost you *nothing* to see for yourself how the world's finest magnetic chuck can increase the output of *your* grinders, millers, planers, shapers. You are welcome to experienced engineering counsel, without charge. *Just write.*

THE TAFT-PEIRCE MFG. CO.

WOONSOCKET, RHODE ISLAND

New
**SUPERPOWER
PRODUCTS**



TAFT-PEIRCE MAGNETIC CHUCK
Style 512

For use on the Taft-Peirce No. 1 Precision Surface Grinder . . . and all other makes and models of small surface grinders. Fine-mesh faceplate holds extremely small work *directly*, without adapters. Made in 110 and 220 volts, D. C. Write for complete details and prices.



TAFT-PEIRCE DOUBLE-UNIT DEMAGNETIZER
Style 9801-2

Of larger capacity than the original *Superpower* AC type, this double unit is built with the same characteristics as the single-unit. Plug into any light socket or AC source. Furnished connected for either 110 or 220 volts, 60 cycle single-phase AC 130 watts. Write for prices.

STEPPED DOWN IN *Size* STEPPED UP IN *Convenience*



THE NEW DICTAPHONE

Cameo

Business and industry currently acclaim the smallness, lightness, and convenience of the new Dictaphone Cameo Model Dictating Machine . . . and for good reason!

Here is a dictating machine over 10 lbs. lighter than its predecessors and occupying considerably less desk area.

The new Dictaphone Cameo Model incorporates all the time-tried and proved features of previous Dictaphone models . . . the full and positive assurance of traditional Dictaphone reliability.

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New pick-up portability even further extends

the universal usefulness of this versatile dictating machine. The new Cameo Model fits easily into a leather zipper case—may be conveniently carried home or on business trips, and can be used on all standard electrical outlets.

Try the new Dictaphone Cameo Dictating Machine . . . at our expense and without obligation. Telephone your local Dictaphone office today for a demonstration.

DICTAPHONE

Dictaphone Corporation, 420 Lexington Ave., N. Y. C.

In Canada—Dictaphone Corporation, Ltd., 86 Richmond Street, West Toronto

- ☐ Send me additional information about the new Dictaphone Cameo dictating machine.
- ☐ I should like to see and try the new Dictaphone Cameo without obligation.

Name

Company

Address

The word DICTAPHONE is the Registered Trade-Mark of Dictaphone Corporation, Makers of Dictating Machines and Accessories to which said Trade-Mark is Applied.

THE IRON AGE, December 28, 1939—73

PRODUCTS INDEX

WHO MAKES IT

Here you find a weekly listing of hundreds of products with the names and addresses of manufacturers. The advertisements of these companies appear in The Iron Age.

ABRASIVE CLOTH & PAPER

Norton Co., Worcester, Mass.

ABRASIVE WHEELS—See Grinding Wheels

ABRASIVES—Polishing

General Abrasive Co., Inc., Niagara Falls, N. Y.

ABRASIVES—Steel Shot and Grit

American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Harrison Abrasive Corp., Manchester, N. H.
Pangborn Corporation, Hagerstown, Md.
Pittsburgh (Pa.) Crushed Steel Co.
Steel Shot & Grit Co., Boston, Mass.

ACCESSORIES—Welding

Lincoln Electric Co., The, Cleveland.

ACCUMULATORS—Hydraulic

Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.
Wood, R. D., & Co., Philadelphia.

ACETYLENE—Dissolved in Cylinders & Small Tanks

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 20 Nass 42nd St., N. Y. C.

ACID-PROOF CEMENT

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

ACIDS—Pickling

American Chemical Paint Co., Ambler, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

AIR CONDITIONING EQUIPMENT

American Blower Corp., 6000 Russell St., Detroit.

ALLOYS—Copper

American Brass Co., The, Waterbury, Conn.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

ALLOYS—Copper Nickel & Nickel Chrome

Driver, Wilbur B., Co., Newark, N. J.

ALLOYS—Ferro

Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Magnesium

American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ALLOYS—Zinc Base Die Casting

New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ALUMINUM

Aluminum Co. of America, Pittsburgh.

AMMETERS & VOLTMETERS

General Electric Co., Schenectady, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.

AMMETERS AND VOLTMETERS—Recording

Leeds & Northrup Co., 4956 Stanton Ave., Philadelphia.

AMMONIA RECOVERY PLANTS

Koppers Co., Engineering & Construction Div., Pittsburgh.

ANGLES, BEAMS, CHANNELS AND TEES

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tube Div. of Republic Steel Corp., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

ANGLES, BEAMS, CHANNELS & TEES—Magnesium Alloys

Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ANNEALING—See Heat Treating

ANNEALING BOXES

Lebanon (Pa.) Steel Foundry.
Pittsburgh (Pa.) Annealing Box Co.
United Engineering & Fdry. Co., Itzsh.

ANNEALING COVERS

Pittsburgh (Pa.) Annealing Box Co.

ANODES—Lead

National Lead Co., 111 Bdw., N. Y. C.

APPAREL—Welding

Lincoln Electric Co., The, Cleveland.

ARBORS

Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARRESTERS—Spark

Harrington & King Perforating Co., Chicago.

ASBESTOS

Carey, Philip, Co., The, Cincinnati, Ohio.
Johns-Manville Corp., 22 East 40th St., N. Y. C.

AXLES—Car or Locomotive

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BABBITT METALS

Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.

Cramp Brass & Iron Foundries Co., Philadelphia.

Gardner Metal Co., 4884 S. Campbell Ave., Chicago.

National Lead Co., 111 Bdw., N. Y. C.

BALANCING EQUIPMENT

Sundstrand Machine Tool Co., Rockford, Ill.

BALANCING MACHINES—Static Dynamic

Gisholt Machine Co., Madison, Wis.

BALING PRESSES—Scrap—See Presses

Baling

BALLS—Burnishing

Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.

Hartford (Conn.) Steel Ball Co., The.

BALLS—Steel, Brass or Bronze

Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.

Hartford (Conn.) Steel Ball Co., The.

New Departure Div., General Motors Sales Corp., Bristol, Conn.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel

Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARRELS—Burnishing

Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.

BARRELS—Tumbling

Baird Mch. Co., The, Bridgeport, Conn.

Hartford (Conn.) Steel Ball Co., The.

Whiting Corp., Harvey, Ill.

BARS—Alloy

Midvale Co., The, Nicetown, Phila., Pa.

Republic Steel Corp., Cleveland, Ohio.

BARS—Aluminum

Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper

Bunting Brass & Bronze Co., Toledo, Ohio.

Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BARS—Cold Drawn

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.

Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.

Jones & Laughlin Steel Corp., Pittsburgh.

Monarch Steel Co., Indianapolis, Ind.

Union Drawn Steel Div., Republic Steel Corp., Massillon, Ohio.

BARS—Concrete, Reinforcing

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

Jones & Laughlin Steel Corp., Pittsburgh.

Laclede Steel Co., St. Louis, Mo.

Nicetown Plate Washer Co., Inc., Philadelphia.

Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARS—Magnesium Alloys

American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Rustless

Midvale Co., The, Nicetown, Phila., Pa.

Rustless Iron & Steel Corp., Baltimore, Md.

BARS—Steel

Bethlehem (Pa.) Steel Company.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Great Lakes Steel Corp., Ecorse, Detroit.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

LaSalle Steel Co., Chicago.

Monarch Steel Co., Indianapolis, Ind.

Republic Steel Corp., Cleveland, Ohio.

Ryerson, Jos. T., & Son, Inc., Chicago.

Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.

Steel & Tube Div. of Republic Steel Corp., Cleveland.

Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Timken Roller Bearing Co., The, Canton, O.

Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

Youngstown (Ohio) Sheet & Tube Co., The.

BATTERIES—Storage

Electric Storage Battery Co., The, Phila.

Philo, Battery Div., Phila., Pa.

BATTERY CHARGERS

Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt

Bunting Brass & Bronze Co., The, Toledo, Ohio.

Cadman, A. W., Mfg. Co., Pittsburgh.

Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BEARINGS—Ball

Bantam Bearings Corp., The, South Bend, Ind.

Bearings Co. of America, Lancaster, Pa.

Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.

New Departure Div., General Motors Sales Corp., Bristol, Conn.

Norma-Hoffmann Bearings Corp., Stamford, Conn.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Schatz Mfg. Co., Poughkeepsie, N. Y.

BEARINGS, Brass and Bronze

Ameco Metal, Inc., Milwaukee, Wis.

Bunting Brass & Bronze Co., Toledo, O.

Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

National Bearing Metals Corp., Pittsburgh.

Shenango-Penn Mold Co., Dover, Ohio.

BEARINGS—Oilless

Bunting Brass & Bronze Co., Toledo, O.

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Quill

Bantam Bearings Corp., The, South Bend, Ind.

BEARINGS—Radial

Bantam Bearings Corp., The, South Bend, Ind.

Bower Roller Bearing Co., Detroit, Mich.

Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.

Hyatt Bearings Div., General Motors Sales Corp., Newark, N. J.

New Departure Div., General Motors Sales Corp., Bristol, Conn.

Norma-Hoffmann Bearings Corp., Stamford, Conn.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Roll Neck

Bantam Bearings Corp., The, South Bend, Ind.

Morgan Construction Co., Worcester, Mass.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller

Bantam Bearings Corp., The, South Bend, Ind.

Bower Roller Bearing Co., Detroit, Mich.

Hyatt Bearings Div., General Motors Sales Corp., Newark, N. J.

Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.

Norma-Hoffmann Bearings Corp., Stamford, Conn.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered

Bantam Bearings Corp., The, South Bend, Ind.

Bower Roller Bearing Co., Detroit, Mich.

Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment

Bantam Bearings Corp., The, South Bend, Ind.

Morgan Construction Co., Worcester, Mass.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Shaft Hanger

Hyatt Bearings Div., General Motors Sales Corp., Newark, N. J.

Norma-Hoffmann Bearings Corp., Stamford, Conn.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BEARINGS—Thrust

Bantam Bearings Corp., The, South Bend, Ind.

Bearings Co. of America, Lancaster, Pa.

Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.

Hyatt Bearings Div., General Motors Sales Corp., Newark, N. J.

New Departure Div., General Motors Sales Corp., Bristol, Conn.

Norma-Hoffmann Bearings Corp., Stamford, Conn.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

Timken Roller Bearing Co., The, Canton, O.

BELT—Conveyor, Elevator

Goodrich, B. F., Co., The, Akron, Ohio.

Hewitt Rubber Corp., Buffalo, N. Y.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BELTING—Leather

Chicago (Ill.) Rawhide Mfg. Co., The, 1308 Elston Ave.

BELTING—Metal, Conveyor, High and Low Temperature

Wicklow, Spencer Steel Co., 500 Fifth Ave., N. Y. C.

BELTING—Rubber

Goodrich, B. F., Co., The, Akron, Ohio.

Hewitt Rubber Corp., Buffalo, N. Y.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BELTS—V-Type

Allis-Chalmers Mfg. Co., Milwaukee.

Goodrich, B. F., Co., The, Akron, Ohio.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BENCH LEGS—Steel

New Britain-Gridley Machine Div., The, New Britain Machine Co., New Britain, Conn.

BENDING MACHINES—Hand, Band and Angle

Excelsior Tool & Mch. Co., E. St. Louis, Ill.

BENDING MACHINES—Hand and Power

Buffalo (N. Y.) Forge Co., 492 Broadway, Cincinnati (Ohio) Shaper Co., The, Cleveland (Ohio) Punch & Shear Works Co., The, Niagara Machine & Tool Works, Buffalo, N. Y.

BENZOL RECOVERY PLANTS

Koppers Co., Engineering & Construction Div., Pittsburgh.

BERYLLIUM COPPER

American Brass Co., The, Waterbury, Conn.

BILLETS—Alloy

Harrisburg (Pa.) Steel Corp.

Midvale Co., The, Nicetown, Phila., Pa.

BILLETS—Alloy Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon

Harrisburg (Pa.) Steel Corp.

PRODUCTS INDEX

Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, Ohio.

CRANES—Electric, Industrial, Truck Mounted
Baker-Hauling Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANES—Electric Traveling
Arnel, James P., Pittsburgh.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, Detroit, Mich.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

CRANES—Gantry
Dravo Corp., Engineering Wks. Div., Pittsburgh.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

CRANES—Hand Power
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

CRANES—Jib
American Monorail Co., The, Cleveland.
Euclid Crane & Hoist Co., The, Euclid, O.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Whiting Corp., Harvey, Ill.

CRANES—Locomotive
American Hoist & Derrick Co., St. Paul, Minn.
Cullen-Friedstedt Co., 1303 S. Kilbourn Ave., Chicago.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.
Ohio Locomotive Crane Co., The, Bucyrus, O.

CRANES—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Portable
Canton Pdry. & Mch. Co., Cleveland.
CRANES—Portable Electric
Baker-Hauling Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANKSHAFTS
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Union Driven Steel Div. Republic Steel Corp., Massillon, Ohio.

CRANKSHAFTS—Forged
Ray City Forge Co., Erie, Pa.
Midvale Co., The, Nicetown, Phila., Pa.

CRUSHERS—Coal
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.
CRUSHERS—Steel Turning
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CUPOLA CHARGING EQUIPMENT
Lake Erie Engineering Corp., 63 Kenmore St., Buffalo, N. Y.

CUTTERS—Die Sinking
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Tomkins-Johnson Co., The, Jackson, Mich.

CUTTERS—Grinding Wheel—see Dressers
CUTTERS—Grinding Wheel
CUTTERS—Kevsating
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

CUTTERS—Milling
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboly Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The, Gairing Tool Co., The, Detroit.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Victor Machinery Exchange, 251 Centre St., N. Y. C.

CUTTING-OFF MACHINES—Abrasives
Tabor Mfg. Co., Phila.

CUTTING-OFF MACHINES—Cold Saw
Espen-Lucas Mch. Wks., Philadelphia.

CUTTING-OFF MACHINES—Pipe or Tubing
Bardons & Oliver, Inc., Cleveland.
Cox & Sons Co., The, Bridgeton, N. J.
Landis Mch. Co., Inc., Waynesboro, Pa.

CUTTING AND WELDING APPARATUS
—Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene.

CYLINDERS—Compressed Air & Hydraulic
Hannifin Mfg. Co., Chicago.
Tomkins-Johnson Co., The, Jackson, Mich.

CYLINDERS—Seamless
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

DEGREASING COMPOUNDS
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

DESIGNING & DEVELOPING
Torrington (Conn.) Mfg. Co., The.

DIAMOND TOOLS
Bausch & Lomb Optical Co., Rochester, N. Y.

DICTATING MACHINES
Dictaphone Corp., 420 Lexington Ave., N. Y. C.

DIE CASTING MACHINES
Reed-Prentice Corp., Worcester, Mass.

DIE—Hard Carbide Inserts
McKenna Metals Co., Latrobe, Pa.

DIE SINKING MACHINES—Automatic and Hand
Cincinnati (Ohio) Milling Mch. Co., The, Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn.

DIEING MACHINES—Automatic
Henry & Wright Mfg. Co., The, Hartford, Conn.

DIES, JIGS, FIXTURES, etc.
Barth Stamping & Mch. Wks., Cleveland.
Star Machine & Tool Co., Cleveland, Ohio.
Taft-Petree Mfg. Co., The, Woonsocket, R. I.

DIES—Cast Tool Steel
Advance Foundry Co., The, Dayton, Ohio.
Detroit (Mich.) Alloy Steel Co., The.

DIES—Drawing & Sizing
Carboly Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.

DIES—Pipe Threading
Landis Mch. Co., Inc., Waynesboro, Pa.
National Acme Co., The, Cleveland.

DIES—Resistance Welding
Mallory, P. R. & Co., Inc., Indianapolis, Ind.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.

Greenfield (Mass.) Tap & Die Corp.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
National Acme Co., The, Cleveland.

DIES—Self-Opening Adjustable
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.

Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murey Machine & Tool Co., Detroit, Mich.

National Acme Co., The, Cleveland.
DIES—Sheet Metal Working
Cimatool Co., The, Dayton, Ohio.
Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

DIES—Steel Letters and Stamps
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

DOORS & SHUTTERS, Fireproof
Kinneer Mfg. Co., Columbus, Ohio.

DOORS & SHUTTERS—Steel or Wood
Kinneer Mfg. Co., Columbus, Ohio.

DRAW BENCHES
McKay Machine Co., The, Youngstown, Ohio.

DRAWN WORK—Metal—See Stampings or Drawings—Metal
DRESSERS—Grinding Wheel
Carboly Co., Inc., 11153 E. 8-Mile Rd., Detroit, Mich.

DRILL HEADS—Hydraulic
National Automatic Tool Co., Richmond, Ind.

DRILL HEADS—Multiple
Baker Bros., Inc., Toledo, Ohio.

DRILLING MACHINES—Bench
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Heavy Duty
Baker Bros., Inc., Toledo, Ohio.
Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.

DRILLING MACHINES—Multiple Spindle
Baker Bros., Inc., Toledo, Ohio.
Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.

Henry & Wright Mfg. Co., The, Hartford, Conn.
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Multiple Spindle Adjustable
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Multiple Spindle Horizontal
Baker Bros., Inc., Toledo, Ohio.
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Portable Electric
Millers Falls Co., Greenfield, Mass.

DRILLING MACHINES—Portable Pneumatic
Helwig Mfg. Co., St. Paul, Minn.
Warner & Swasey Co., The, Cleveland.

DRILLING MACHINES—Radial
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Bickford Tool Co., The, Cleveland (Ohio) Punch & Shear Works Co., The.

DRILLING MACHINES—Sensitive
Buffalo (N. Y.) Forge Co., 492 Broadway, Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Upright
Baker Bros., Inc., Toledo, Ohio.
Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.

Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Bickford Tool Co., The, Cleveland (Ohio) Punch & Shear Works Co., The.

DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, Ohio.
Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.

Cincinnati (Ohio) Bickford Tool Co., The, Cleeream Mch. Tool Co., Green Bay, Wis.

DRIVES—Gear
Farrel-Birmingham Co., Inc., Buffalo, N. Y.
Mesta Mch. Co., Pittsburgh.

DRIVES—Single & Multiple V-Belts
Allis-Chalmers Mfg. Co., Milwaukee.

DROP FORGINGS—See Forgings—Drop Iron or Steel
DROP HAMMERS—See Hammers—Drop Iron or Steel

DUST COLLECTORS
Abrasive Machine Tool Co., East Providence, R. I.
American Blower Corp., 6000 Russell St., Detroit.

American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Panthern Corporation, Hagerstown, Md.
Whiting Corp., Harvey, Ill.

ECONOMIZERS
Babeck & Wilcox Co., The, 85 Liberty St., N. Y. C.

ELECTRIC LIGHTING—Industrial
General Electric Co., Nela Park, Cleveland.

ELECTRIC WELDING—See Welding—Electric

ELECTRICAL EQUIPMENT
Allis-Chalmers Mfg. Co., Milwaukee.

ELECTRICAL MACHINERY—Second Hand. (See Clearing House Section)

ELECTRICAL WIRES
Roebbling's, John A., Sons Co., Trenton, N. J.

ELECTRODE HOLDERS—Welding
Lincoln Electric Co., The, Cleveland.

ELECTRODES—Resistance Welding
Mallory, P. R. & Co., Inc., Indianapolis, Ind.

ELECTRODES—Welding, Coated
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Metal & Thermit Corp., 129 Broadway, N. Y. C.

ELECTROPLATING EQUIPMENT & SUPPLIES
Columbia Electric Mfg. Co., 4523 Hamilton Ave., Cleveland, Ohio.
United Chromium, Incorporated, 51 East 42nd St., N. Y. C.

ELEVATORS—Material Handling
Link-Belt Co., 300 West Pershing Road, Chicago.

EMERY WHEELS—See Grinding Wheels

ENGINEERS—Consulting and Industrial
Koppers Co., Engineering & Construction Div., Pittsburgh.
Lindemuth, Lewis B., 134 East 47th St., N. Y. C.

ENGINEERS—Metallurgical
Gathmann Engineering Co., The, Baltimore, Md.

ENGINES—Diesel
Diesel Engine Div. General Motors Sales Corp., Cleveland.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES—Gas
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES—Oil
Worthington Pump & Machinery Corp., Harrison, N. J.

EYELET MACHINES
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

FACING CLAY
Carborundum Co., The, Perth Amboy, N. J.

FACTORY & PLANT SITES
Zoll, Edward H., 196 Market St., Newark, N. J.

FANS—Ventilating
American Blower Corp., 6000 Russell St., Detroit.

Buffalo (N. Y.) Forge Co., 492 Broadway.
FEED WATER HEATERS AND PURIFIERS
Harrisburg (Pa.) Steel Corp.

FEEDS—Hydraulic, for Machines
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

FELT—Wool Mechanical
American Felt Co., 315 Fourth Ave., N. Y. C.

FENCING—Wire
Pittsburgh (Pa.) Steel Co.

FERRALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Metal & Thermit Corp., 120 Broadway, N. Y. C.

Ohio Ferro-Alloys Corp., Canton, Ohio.
FERRONCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Jones & Laughlin Steel Corp., Pittsburgh.
Oglebay, Norton & Co., Cleveland.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank & Co., Inc., Philadelphia.

FERROMANGANESE
Bethlehem (Pa.) Steel Co.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Jones & Laughlin Steel Corp., Pittsburgh.
Oglebay, Norton & Co., Cleveland.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank & Co., Inc., Philadelphia.

FERROPHOSPHORUS
Oglebay, Norton & Co., Cleveland.

FERROSILICO MANGANESE
Oglebay, Norton & Co., Cleveland.
Ohio Ferro-Alloys Corp., Canton, Ohio.

FERROSILICON
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Oglebay, Norton & Co., Cleveland.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank & Co., Inc., Philadelphia.

FERROSPICELEISEN
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

Oglebay, Norton & Co., Cleveland.
FERROTITANIUM
Metal & Thermit Corp., 120 Broadway, N. Y. C.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

FIBRE—Sheets, Tubes, Rods, Fabricated Parts
Continental-Diamond Fibre Co., Newark, Delaware.

FILES & RASPS
Atkins, E. C. & Co., Indianapolis, Ind.
Dixon, Henry & Sons, Inc., Philadelphia.
Nicholson File Co., Providence, R. I.

FILING MACHINES
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

FILTER CLOTH—Asbestos
Johns-Manville Corp., 22 East 40th St., New York City.

FILTERS—Air
Whiting Corp., Harvey, Ill.

FILTERS—Oil
Cuno Engineering Corp., Meriden, Conn.
National Acme Co., The, Cleveland.

FIRE BRICK—Insulating
Babeck & Wilcox Co., The, 85 Liberty St., N. Y. C.

FIRE CLAY
Carborundum Co., The, Perth Amboy, N. J.
Illinois Clay Products Co., Joliet, Ill.
Commonwealth Brass Corp., Detroit, Mich.

FITTINGS—Brass, Pipe and Tube
Commonwealth Brass Corp., Detroit, Mich.

PRODUCTS INDEX

FLANGES—Forged Steel
Harrisburg (Pa.) Steel Corp.
Standard Steel Wks. Co., Phila., Pa.

FLANGES—Welded Steel
King Fifth Wheel Co., 5031 Beaumont
Ave., Philadelphia.

FLANGING WORK—Carbon and Alloy
Worth Steel Co., Claymont, Del.

FLEXIBLE SHAFT EQUIPMENT
Strand, N. A., & Co., Chicago.

FLOODLIGHTS—Acetylene
Linde Air Products Company, The, 30 East
42nd St., N. Y. C.

**FLOOR PLATES—See Plates—Floor &
Cellar Door**

FLOORING—Acid Proof
Nukem Products Corp., 68 Niagara St.
Buffalo, N. Y.

FLOORING—Monolithic
Carey, Philip, Co., The, Cincinnati, Ohio.
Johns-Manville Corp., 22 East 40th St.
New York City.

FLOORING—Open Steel
Blaw-Knox Div. of Blaw-Knox Co., Pitts-
burgh.

FLOORING—Open Steel
Dravo Corp., Engineering Wks. Div.,
Pittsburgh.
Hendrick Mfg. Co., Carbondale, Pa.
Kerlow Steel Flooring Co., Jersey City,
N. J.

FLUX—Soldering (Stainless Steel)
Ruby Chemical Co., Columbus, Ohio.

FLUX—Welding
Linde Air Products Company, The, 30 East
42nd St., N. Y. C.

FORGING MACHINES—Roll
Ajax Mfg. Co., The, Cleveland, Ohio.

FORGING MACHINES—Upset
Ajax Mfg. Co., The, Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.

FORGINGS—Alloy Steel
National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Aluminum
Aluminum Co. of America, Pittsburgh.

FORGINGS—Brass, Bronze or Copper
American Brass Co., The, Waterbury,
Conn.

FORGINGS—Brass, Bronze or Copper
Commonwealth Brass Corp., Detroit.
Cramp Brass & Iron Foundries Co., Phila-
delphia.

FORGINGS—Steel
Harvey Metal Corp., The, Chicago, Ill.
Titan Metal Mfg. Co., Bellefonte, Pa.
Transue & Williams Steel Forging Corp.,
Alliance, Ohio.

FORGINGS—Coin Pressed
Rockford (Ill.) Drop Forge Co.

FORGINGS—Drop Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Billings & Spencer Co., The, Hartford,
Conn.

FORGINGS—Drop Iron or Steel
Canton (Ohio) Drop Forging & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.

FORGINGS—Drop Iron or Steel
Champion Machine & Forging Co., The,
Cleveland, Ohio.

FORGINGS—Drop Iron or Steel
Poor & Co., Canton Forge & Axle Wks.,
Canton, Ohio.

FORGINGS—Drop Iron or Steel
Rockford (Ill.) Drop Forge Co.
Transue & Williams Steel Forging Corp.,
Alliance, Ohio.

FORGINGS—Drop Iron or Steel
Wilcox, D., Mfg. Co., Mechanicsburg, Pa.

FORGINGS—Hollow
Harrisburg (Pa.) Steel Corp.

FORGINGS—Hollow
Midvale Co., The, Nicetown, Phila., Pa.
National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Hollow
Standard Steel Wks. Co., Phila., Pa.

**FORGINGS—Hydraulic Press, Iron or
Steel**
Atlas Drop Forge Co., Lansing, Mich.

**FORGINGS—Hydraulic Press, Iron or
Steel**
Bay City Forge Co., Erie, Pa.

**FORGINGS—Hydraulic Press, Iron or
Steel**
Bethlehem (Pa.) Steel Company.
Mesta Mch. Co., Pittsburgh.

**FORGINGS—Hydraulic Press, Iron or
Steel**
Midvale Co., The, Nicetown, Phila., Pa.
National Forge & Ordnance Co., Irvine, Pa.

**FORGINGS—Hydraulic Press, Iron or
Steel**
Standard Steel Wks. Co., Phila., Pa.

FORGINGS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf
Bldg., Pittsburgh.

FORGINGS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave.,
Midland, Mich.

FORGINGS—Steel
Bethlehem (Pa.) Steel Company.
Norris Bros., Inc., Robinson, Ill.
Rockford (Ill.) Drop Forge Co.

FOUNDRY EQUIPMENT & SUPPLIES
Whiting Corp., Harvey, Ill.

FURNACES—Billet or Ingot Heating
Salem (Ohio) Engineering Co.

FURNACES—Brass Melting
Monarch Engineering & Mfg. Co., The,
Baltimore, Md.

FURNACES—Forging
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.

FURNACES—Forging
Salem (Ohio) Engineering Co.
Stewart Furnace Div., Chicago Flexible
Shaft Co., Chicago.

FURNACES—Heat Treating, Automatic
American Gas Furnace Co., Elizabeth,
N. J.

FURNACES—Heat Treating, Automatic
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.

FURNACES—Heat Treating, Automatic
Leeds & Northrup Co., 4956 Stenton Ave.,
Philadelphia.

FURNACES—Heat Treating, Automatic
Lindberg Engineering Co., 228 North
Lafayette St., Chicago, Ill.

FURNACES—Heat Treating, Automatic
Rockwell, W. S., Co., 50 Church St., N.Y.C.
Salem (Ohio) Engineering Co.

FURNACES—Heat Treating, Automatic
Stewart Furnace Div., Chicago Flexible
Shaft Co., Chicago.

**FURNACES—Heat Treating, Controlled
Atmosphere**
Lindberg Engineering Co., 228 North
Lafayette St., Chicago, Ill.

**FURNACES—Heat Treating, Cyanide or
Lead**
Electric Furnace Co., The, Salem, Ohio.
Lindberg Engineering Co., 228 North
Lafayette St., Chicago, Ill.

**FURNACES—Heat Treating, Cyanide or
Lead**
Stewart Furnace Div., Chicago Flexible
Shaft Co., Chicago.

FURNACES—Heat Treating, Electric
Electric Furnace Co., The, Salem, Ohio.
General Electric Co., Schenectady, N. Y.

FURNACES—Heat Treating, Electric
Holcroft & Co., Detroit.
Hoskins Mfg. Co., Detroit, Mich.

FURNACES—Heat Treating, Electric
Leeds & Northrup Co., 4956 Stenton Ave.,
Philadelphia.

FURNACES—Heat Treating, Electric
Lindberg Engineering Co., 228 North
Lafayette St., Chicago, Ill.

FURNACES—Heat Treating, Electric
Rockwell, W. S., Co., 50 Church St., N.Y.C.
Salem (Ohio) Engineering Co.

FURNACES—Heat Treating, Electric
Westinghouse Electric & Mfg. Co., East
Pittsburgh, Pa.

FURNACES—Heat Treating, Oil or Gas
American Gas Furnace Co., Elizabeth,
N. J.

FURNACES—Heat Treating, Oil or Gas
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.

FURNACES—Heat Treating, Oil or Gas
Lindberg Engineering Co., 228 North
Lafayette St., Chicago, Ill.

FURNACES—Heat Treating, Oil or Gas
Monarch Engineering & Mfg. Co., The,
Baltimore, Md.

FURNACES—Heat Treating, Oil or Gas
Pennsylvania Industrial Engineers, Pitts-
burgh.

FURNACES—Heat Treating, Oil or Gas
Salem (Ohio) Engineering Co.
Stewart Furnace Div., Chicago Flexible
Shaft Co., Chicago.

FURNACES—Non-Ferrous Melting
Detroit Electric Furnace Div. Kuhlman
Electric Co., Bay City, Mich.

FURNACES—Open Hearth, Consultant
Lindemuth, Lewis B., 134 East 47th St.,
N. Y. C.

FURNACES—Pack Heating Sheets
Wean Engineering Co., Inc., The, Warren,
Ohio.

FURNACES—Rivet Heating, Gas
Stewart Furnace Div., Chicago Flexible
Shaft Co., Chicago.

FURNACES—Tempering
Lindberg Engineering Co., 228 North
Lafayette St., Chicago, Ill.

**FURNACES—Wire, Annealing and Gal-
vanizing**
General Electric Co., Schenectady, N. Y.

**FURNACES—Wire, Annealing and Gal-
vanizing**
Salem (Ohio) Engineering Co.
Stewart Furnace Div., Chicago Flexible
Shaft Co., Chicago.

GAGE BLOCKS
Deaborn (Mich.) Gage Co.

GAGE BLOCKS
Ford Motor Co. (C. E. Johansson Divi-
sion), Dearborn, Mich.

GAGE BLOCKS
Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

GAGES—Electric
Sheffield Gage Corp., Dayton, Ohio.

GAGES—Electric
Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

GAGES—Electric
Sheffield Gage Corp., Dayton, Ohio.

GAGES—Plug and Snap
Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

GAGES—Pressure & Vacuum Recording
Brown Instrument Co., The, Philadelphia.

GAGES—Surface
Millers Falls Co., Greenfield, Mass.

GALVANIZING PLANTS—For Sheets
Erie (Pa.) Foundry Co.

GALVANIZING POTS
Pittsburgh (Pa.) Annealing Box Co.

GAS ANALYSIS RECORDERS
Brown Instrument Co., The, Philadelphia.
Leeds & Northrup Co., 4956 Stenton Ave.,
Philadelphia.

GAS FOR INDUSTRIAL USES
American Gas Association, 420 Lexington
Ave., N. Y. C.

GAS PRODUCERS
Koppers Co., Engineering & Construction
Div., Pittsburgh.

GASKETS—Asbestos, Metal or Rubber
Garlock Packing Co., The, Palmyra, N.Y.
Johns-Manville Corp., 22 East 40th St.,
New York City.

GEAR CHECKING EQUIPMENT
Michigan Tool Co., Detroit, Mich.

GEAR CUTTING
Earle Gear & Machine Co., Phila.
Farrel-Birmingham Co., Inc., Buffalo, N.Y.

GEAR CUTTING
Foots Bros. Gear & Machine Co., 5301-H
So. Western Blvd., Chicago, Ill.

GEAR CUTTING
Gleason Works, Rochester, N. Y.
Harford (Conn.) Special Machinery Co.,
The.

GEAR CUTTING
National-Erie Corp., Erie, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Waltham (Mass.) Watch Co.

GEAR CUTTING MACHINES
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Gleason Works, Rochester, N. Y.

GEAR DRIVES—Herringbone
Continental Roll & Steel Foundry Co.,
East Chicago, Ind.

GEAR DRIVES—Herringbone
Lewis Foundry & Machine Div. of Blaw-
Knox Co., Pittsburgh.

GEAR DRIVES—Herringbone
United Engineering & Fdry. Co., Pgh.

GEAR HOBBING MACHINES
Barber-Colman Co., Rockford, Ill.

GEAR LAPPING MACHINES
Michigan Tool Co., Detroit, Mich.

GEARMOTORS
Allis-Chalmers Mfg. Co., Milwaukee.
General Electric Co., Schenectady, N. Y.

GEARS—Bevel
Gleason Works, Rochester, N. Y.
National-Erie Corp., Erie, Pa.

GEARS—Carbon Hard-surfaced
Foots Bros. Gear & Machine Co., 5301-H
So. Western Blvd., Chicago, Ill.

GEARS—Heat Treated
Gleason Works, Rochester, N. Y.
Simonds Gear & Mfg. Co., Pittsburgh.

GEARS—Helical
Foots Bros. Gear & Machine Co., 5301-H
So. Western Blvd., Chicago, Ill.

GEARS—Herringbone
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Mesta Mch. Co., Pittsburgh.

GEARS—Machine Cut
Gleason Works, Rochester, N. Y.
National-Erie Corp., Erie, Pa.

GEARS—Machine Cut
Simonds Gear & Mfg. Co., Pittsburgh.

GEARS—Machine Molded
Poole Foundry & Mch. Co., Baltimore, Md.

GEARS—Non-Metallic
Chicago (Ill.) Rawhide Mfg. Co., The,
1306 Elston Ave.

GEARS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The,
1306 Elston Ave.

GEARS—Spur
Simonds Gear & Mfg. Co., Pittsburgh.

GEARS—Steel, Silent
Waldron, John, Corp., New Brunswick,
N. J.

GEARS—Worm
Cone Worm Gear Div., Michigan Tool Co.,
Detroit, Mich.

GENERATORS—Acetylene
Air Reduction Sales Co., 60 East 42nd St.,
N. Y. C.

GENERATORS—Electric
Linde Air Products Company, The, 30 East
42nd St., N. Y. C.

GENERATORS—Electric
Chicago (Ill.) Electric Co., 4523 Hamilton
Ave., Cleveland, Ohio.

GENERATORS—Electric
Crocker-Wheeler Electric Mfg. Co., Am-
herst, N. J.

GENERATORS—Electric
General Electric Co., Schenectady, N. Y.
Hoskins Mfg. Co., Detroit, Mich.

GENERATORS—Electric
Westinghouse Elec. & Mfg. Co., East Pgh.

**GENERATORS—Electric, Second Hand,
(See Clearing House Section)**

GOOGLES—Safety
American Optical Co., Southbridge, Mass.

GOVERNORS—Air Compressor
Westinghouse Air Brake Co., Industrial
Div., Pittsburgh.

GRABS—For Sheets and Coils
J-B Engineering Sales Co., 1738 Orange
St., New Haven, Conn.

GRADUATING MACHINES—Metal
Noble & Westbrook Mfg. Co., The, E.
Hartford, Conn.

**GRATING—Flooring, Sidewalk, etc.—See
Flooring—Open Steel**

GREASE—Lubricating
Gulf Oil Corp., Gulf Refining Co., Pitts-
burgh.

GRINDING MACHINES—Centerless
Cincinnati (Ohio) Grinders Incorporated.

GRINDING MACHINES—Chucking
Bryant Chucking Grinder Co., Springfield,
Vt.

GRINDING MACHINES—Cylinder
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES—Cylindrical
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati (Ohio) Grinders Incorporated.

GRINDING MACHINES—Die
Landis Mch. Co., Inc., Waynesboro, Pa.

GRINDING MACHINES—Drill
Landis Mch. Co., Inc., Waynesboro, Pa.

GRINDING MACHINES—Gear & Worm
Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

GRINDING MACHINES—Gear & Worm
Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

GRINDING MACHINES—Internal
Bryant Chucking Grinder Co., Springfield,
Vt.

GRINDING MACHINES—Internal
Greenfield (Mass.) Tap & Die Corp.
Heald Machine Co., Worcester, Mass.

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Heald Machine Co., Worcester, Mass.

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Heald Machine Co., Worcester, Mass.

PRODUCTS INDEX

GRINDING MACHINES—Tap
Gallmeyer & Livingston Co., Grand Rapids, Mich.

GRINDING MACHINES—Tool
Cincinnati (Ohio) Milling Mch. Co., The. Gallmeyer & Livingston Co., Grand Rapids, Mich.
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Universal
Cincinnati (Ohio) Grinders Incorporated, Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Valve
Landis Tool Co., Waynesboro, Pa.

GRINDING WHEELS
Bakelite Corp., 247 Park Ave., New York City.

Blanchard Machine Co., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N.Y.
MacIn Company, Jackson, Mich.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 32 Townsend St., Passaic, N. J.
Norton Co., Worcester, Mass.

GRINDING WHEELS—Segment
Blanchard Machine Co., Cambridge, Mass.

GRIT—Steel
Harrison Abrasive Corp., Manchester, N. H.

Pittsburgh (Pa.) Crushed Steel Co.

HACK SAW BLADES—See Saws—Hack

Saw Blades

HACK SAW MACHINES
Armstrong-Blum Mfg. Co., Chicago.

Atkins, E. C. & Co., Indianapolis, Ind.

HAMMER BOARDS
Irwin, H. G., Lumber Co., Erie, Pa.

HAMMERS—Air, Forging
Lake Erie Engineering Corp., 68 Kenmore St., Buffalo, N. Y.

Lodell Car Wheel Co., Hazel Hammer Div., Wilmington, Del.

HAMMERS—Drop
Ajax Mfg. Co., The, Cleveland.

Billings & Spencer Co., Hartford, Conn.

Erie (Pa.) Foundry Co.

Morgan Engineering Co., The, Alliance, O.

HAMMERS—Helve
Bradley, C. C. & Son, Inc., Syracuse, N. Y.

HAMMERS—Machinists'
Ushco, 135 Tonawanda St., Buffalo, N. Y.

HAMMERS—Power
Bradley, C. C. & Son, Inc., Syracuse, N. Y.

HAMMERS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.

HAMMERS—Steam
Erie (Pa.) Foundry Co.

Morgan Engineering Co., The, Alliance, O.

HANGER BEARINGS
Dodge Mfg. Corp., Mishawaka, Ind.

HANGERS—Ball Bearing
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

HANGERS—Roller Bearing
Hyatt Bearings Div. General Motors Sales Corp., Newark, N. J.

HANGERS—Shaft
Dodge Mfg. Corp., Mishawaka, Ind.

HEADING MACHINES
Ajax Mfg. Co., The, Cleveland, Ohio.

National Machinery Co., Tiffin, Ohio.

HEADING MACHINES—Automatic, Electric
National Machinery Co., Tiffin, Ohio.

Waterbury (Conn.) Farrel Foundry & Machine Co., The.

HEADS—Spun and Pressed
Worth Steel Co., Claymont, Del.

HEAT TREATING
Barnes-Gibson-Raymond, Detroit Plant Div. of Associated Spring Corp.

Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.

General Machine Wks., York, Pa.

Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.

Parish Pressed Steel Co., Reading, Pa.

Pennsylvania Industrial Engineers, Pittsburgh.

HEAT TREATING EQUIPMENT—Air
Draw

Herrington & Randall, Inc., Detroit.

HEATERS—Unit
Buffalo (N. Y.) Forge Co., 492 Broadway.

Dravo Corp., Engineering Wks. Div., Pittsburgh.

HOBS
Barber-Colman Co., Rockford, Ill.

HOISTS—Air
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.

Detroit (Mich.) Hoist & Mach. Co.

Northern Engineering Works, Detroit.

HOISTS—Chain
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

HOISTS—Electric
American Engineering Co., Philadelphia.

Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.

Detroit (Mich.) Hoist & Mach. Co.

Euclid Crane & Hoist Co., The, Euclid, O.

Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.

Northern Engineering Works, Detroit, Mich.

Robbins & Myers, Inc., Springfield, Ohio.

Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

HOISTS—Electric Traveling
American Monorail Co., The, Cleveland.

Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Euclid Crane & Hoist Co., The, Euclid, O.

Northern Engineering Works, Detroit.

Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

HOISTS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Euclid Crane & Hoist Co., The, Euclid, O.

Northern Engineering Works, Detroit.

Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HONING MACHINES—Vertical & Horizontal
Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.

HOOKS—Wire
Titchener, E. H. & Co., Binghamton, N. Y.

HOSE—Air, Oil, Steam and Water
Hewitt Rubber Corp., Buffalo, N. Y.

HOSE—Flexible Metallic
American Brass Co., The, Waterbury, Conn.

HOSE—Rubber
Goodrich, B. F. Co., The, Akron, Ohio.

Hewitt Rubber Corp., Buffalo, N. Y.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

HOT TOPS
Oxley, Norton & Co., Cleveland.

HYDRANTS—Fire
Wood, R. D. & Co., Philadelphia.

HYDRAULIC MACHINERY
Baldwin-Southwark Corp., Southwark Div., Philadelphia.

Birdsboro (Pa.) Steel Foundry & Machine Co.

Continental Roll & Steel Foundry Co., East Chicago, Ind.

Denison Engineering Co., The, Columbus, Ohio.

Farquhar, A. B. Co., Ltd., York, Pa.

Lake Erie Engineering Corp., 68 Kenmore St., Buffalo, N. Y.

Morgan Engineering Co., The, Alliance, O.

Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.

Wood, R. D. & Co., Philadelphia.

INGOT MOLDS
Gathmann Engineering Co., The, Baltimore, Md.

Shenango-Penn Mold Co., Dover, Ohio.

INGOTS—Aluminum
Aluminum Co. of America, Pittsburgh.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.

INSTRUMENTS—Electric
General Electric Co., Schenectady, N. Y.

Western Electric Instrument Corp., Newark, N. J.

INSTRUMENTS—Recording
Brown Instrument Co., The, Philadelphia.

Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

INSULATING MATERIALS—Electrical
Continental-Diamond Fibre Co., Newark, Delaware.

INSULATION
Johns-Manville Corp., 22 East 40th St., New York City.

IRON—Genuine Open Hearth Iron
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.

IRON—Rustless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

IRON WORKERS—Universal
Buffalo (N. Y.) Forge Co., 492 Broadway.

JIGS, FIXTURES, DIES, etc. (See Dies, Jigs, Fixtures, etc.)

KEYS—Riveted
Western Wire Prods. Co., St. Louis, Mo.

KEYSEATING MACHINES
Baker Bros., Inc., Toledo, Ohio.

Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

LACING—Belt, Rawhide or Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LAMPS—Fluorescent
General Electric Co., Nela Park, Cleveland.

Westinghouse Electric & Mfg. Co., Lighting Div., Cleveland, Ohio.

LAMPS—Mercury Vapor
General Electric Co., Nela Park, Cleveland.

LAPPING MACHINES
Cincinnati (Ohio) Grinders Incorporated.

LATHE ATTACHMENTS
Hendey Machine Co., Torrington, Conn.

South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Automatic
Baird Mch. Co., The, Bridgeport, Conn.

Bullard Co., The, Bridgeport, Conn.

Gisholt Machine Co., Madison, Wis.

Goss & De Leeuw Mch. Co., New Britain, Conn.

Jones & Lamson Mch. Co., Springfield, Vt. R. I.

LeBlond, R. K., Mch. Tool Co., Cincinnati.

Monarch Mch. Tool Co., The, Sidney, O.

Potter & Johnston Machine Co., Pawtucket, R. I.

Sundstrand Machine Tool Co., Rockford, Ill.

LATHES—Automatic Vertical
Baird Mch. Co., The, Bridgeport, Conn.

Bullard Co., The, Bridgeport, Conn.

Gisholt Machine Co., Madison, Wis.

LATHES—Bench
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

Rivett Lathe & Grinder, Inc., Boston, Mass.

South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Brass
Gisholt Machine Co., Madison, Wisconsin.

South Bend (Ind.) Lathe Works, 587 East Madison St.

Warner & Swasey Co., The, Cleveland.

LATHES—Chucking
Gisholt Machine Co., Madison, Wisconsin.

Jones & Lamson Mch. Co., Springfield, Vt.

Potter & Johnston Machine Co., Pawtucket, R. I.

South Bend (Ind.) Lathe Works, 587 East Madison St.

Warner & Swasey Co., The, Cleveland.

LATHES—Contour Turning
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Crankschaft
LeBlond, R. K., Mch. Tool Co., Cincinnati.

Potter & Johnston Machine Co., Pawtucket, R. I.

LATHES—Engine
Bryant Machinery & Engineering Co., Chicago.

Cincinnati (Ohio) Lathe & Tool Co.

Hendey Machine Co., Torrington, Conn.

Hill-Clarke Mch. Co., 647 W. Washington Blvd., Chicago.

LeBlond, R. K., Mch. Tool Co., Cincinnati.

Monarch Mch. Tool Co., The, Sidney, O.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

Reed-Prentice Corp., Worcester, Mass.

Rockford (Ill.) Machine Tool Co.

South Bend (Ind.) Lathe Works, 587 East Madison St.

Sundstrand Machine Tool Co., Rockford, Ill.

LATHES—High Speed
Hendey Machine Co., Torrington, Conn.

South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Roll
Continental Roll & Steel Foundry Co., East Chicago, Ind.

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.

Meigs Mch. Co., Pittsburgh.

United Engineering & Fdry. Co., Pgh. House Section)

LATHES—Toolroom
Cincinnati (Ohio) Lathe & Tool Co.

LeBlond, R. K., Machine Tool Co., Cincinnati, Ohio.

Monarch Mch. Tool Co., The, Sidney, O.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Turret
Acme Machine Tool Co., The, Cincinnati, Ohio.

Bardons & Oliver, Inc., Cleveland.

Bullard Co., The, Bridgeport, Conn.

Gisholt Machine Co., Madison, Wis.

Jones & Lamson Mch. Co., Springfield, Vt.

Potter & Johnston Machine Co., Pawtucket, R. I.

South Bend (Ind.) Lathe Works, 587 East Madison St.

Warner & Swasey Co., The, Cleveland.

LATHES, Turret, Vertical
Bullard Co., The, Bridgeport, Conn.

LAYOUT FLUID
Dayton Rogers Mfg. Co., Minneapolis, Minn.

LEAD LININGS
National Lead Co., 111 Bdw., N. Y. C.

LEAD—In Oil
National Lead Co., 111 Bdw., N. Y. C.

LEAD—Tellurium
National Lead Co., 111 Bdw., N. Y. C.

LEATHER—Cup
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LEVELING MACHINES
McKay Machine Co., The, Youngstown, Ohio.

Schats Mfg. Co., The, Ponchikewine, N. Y.

Torrington (Conn.) Mfg. Co., The.

Wean Engineering Co., Inc., The, Warren, O.

LOCOMOTIVES—Diesel
Diesel Engine Div. General Motors Sales Corp., Cleveland.

LOCOMOTIVES—Electric
Atlas Car & Mfg. Co., The, Cleveland.

Davenport (Iowa) Locomotive Works, a Division of Davenport Besler Corp.

LOCOMOTIVES—Gas-Electric
Davenport (Iowa) Locomotive Works, a Division of Davenport Besler Corp.

LOCOMOTIVES—Gasoline
Plymouth (Ohio) Locomotive Works Div. Fate-Root-Heath Co.

LOCOMOTIVES—Industrial
Davenport (Iowa) Locomotive Works, a Division of Davenport Besler Corp.

Diesel Engine Div. General Motors Sales Corp., Cleveland.

Plymouth (Ohio) Locomotive Works Div. Fate-Root-Heath Co.

LOCOMOTIVES—Steam
Iron & Steel Products, Inc., Chicago.

LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., The, Cleveland.

LUBRICANTS—Crusher & Grinding
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.

Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.

Sun Oil Co., Philadelphia.

Texas Company, The, 135 East 42nd St., N. Y. C.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Gear
Cities Service Oil Co., 60 Wall Tower, N. Y. C.

Gulf Oil Corp., Gulf Refining Co., Pittsburgh.

Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.

Standard Oil Co. (Indiana), Chicago.

Sun Oil Co., Philadelphia.

Texas Company, The, 135 East 42nd St., N. Y. C.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—High Pressure & Temperature
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.

Penola, Inc., Pittsburgh.

Pure Oil Co., The, Chicago.

Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.

Standard Oil Co. (Indiana), Chicago.

Sun Oil Co., Philadelphia.

Texas Company, The, 135 East 42nd St., N. Y. C.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mine Cars
Cities Service Oil Co., 60 Wall Tower, N. Y. C.

Gulf Oil Corp., Gulf Refining Co., Pittsburgh.

Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.

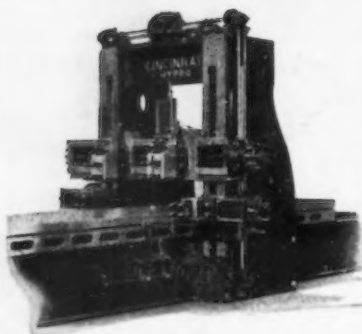
Sun Oil Co., Philadelphia.

Texas Company, The, 135 East 42nd St., N. Y. C.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

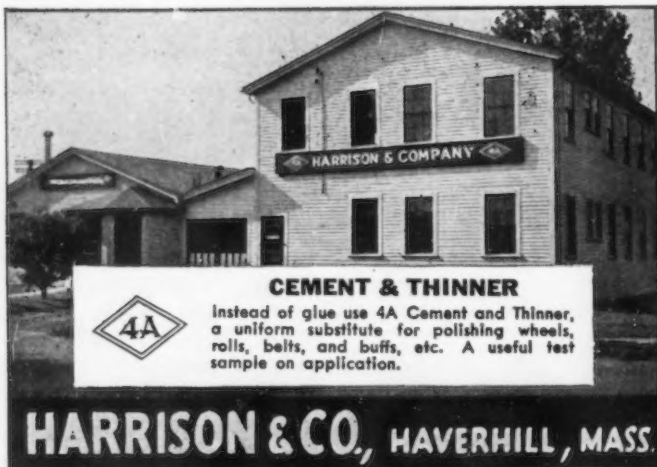
LUBRICANTS—Mining Machines
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.

Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.



PLANERS
Double Housing
Openside
CRANK PLANERS
PLANER TYPE
MILLERS
VERTICAL
BORING MILLS

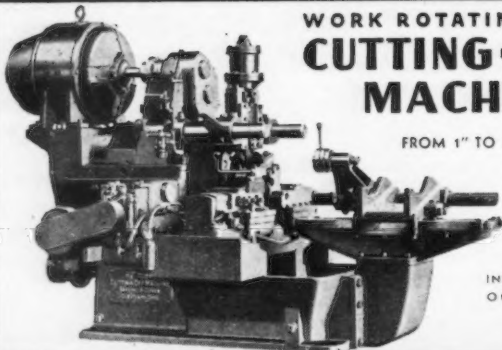
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CINCINNATI, OHIO



CEMENT & THINNER
Instead of glue use 4A Cement and Thinner, a uniform substitute for polishing wheels, rolls, belts, and buffs, etc. A useful test sample on application.

HARRISON & CO., HAVERHILL, MASS.

BARDONS & OLIVER



WORK ROTATING TYPE
CUTTING-OFF
MACHINES

FROM 1" TO 26" CAPACITY

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ON REQUEST

BARDONS & OLIVER, INC. • • • CLEVELAND, OHIO

GOSS and DE LEEUW
MULTIPLE SPINDLE

CHUCKING MACHINES

Four, Five, Six, Eight Spindles • Work and Tool Rotating Types,
GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.



HIGH QUALITY
FLEXIBLE SHAFTS
and
MACHINES
1/8 to 3 H.P.
SEND FOR CATALOG

N. A. STRAND & CO., 5301-5309 NO. WOLCOTT AVE., CHICAGO

General Machine Works, York, Pa.
Gilmour, J. Morrison, 151 Lafayette St.,
N. Y. C.

Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Treadwell Engineering Co., Easton, Pa.

MACHINERY DEALERS—Second-Hand
(See Clearing House Section)

MACHINISTS' SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence,
R. I.

Millers Falls Co., Greenfield, Mass.

MAGNESITE—Brick or Dead Burnt
Carborundum Co., The, Perth Amboy, N. J.

MAGNESIUM
American Magnesium Corp., 1701 Gulf
Bldg., Pittsburgh.

Dow Chemical Co., The, 921 Jefferson Ave.,
Midland, Mich.

MAGNETS—Lifting
Cutler-Hammer, Inc., Milwaukee.

Dings Magnetic Separator Co., 727 Smith
St., Milwaukee.

Electric Controller & Mfg. Co., The, Cleve.
Kiekhoefer Corp., Cedarburg, Wisc.

Ohio Electric Mfg. Co., The, 5905 Mauric
Ave., Cleveland.

MAGNETS—Separating—See Separators
—Magnetic

MALLETS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The,
1306 Elston Ave.

MANDRELS—Expanding
Nicholson, W. H. & Co., 165 Oregon St.,
Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 East
42nd St., N. Y. C.

MANHOLE FITTINGS AND SADDLES
Worth Steel Co., Clarmont, Del.

MANIFOLDS—Oxygen & Acetylene
Air Reduction Sales Co., 60 East 42nd
St., N. Y. C.

Linde Air Products Company, The, 30 East
42nd St., N. Y. C.

MARKING MACHINES
Noble & Westbrook Mfg. Co., The, East
Hartford, Conn.

METAL CLEANING COMPOUNDS
Magnus Chemical Co., 46 South Ave., Gar-
wood, N. J.

Pennsylvania Salt Mfg. Co., Philadelphia.

METAL SPECIALTIES
Crosby Co., The, Buffalo, N. Y.

Torrington (Conn.) Company.

Whitehead Stamping Co., 1669 W. Lafay-
ette Blvd., Detroit, Mich.

Worcester (Mass.) Stamped Metal Co., 6
Hunt St.

METAL TREATING
Metlab Co., Philadelphia, Pa.

METALLOGRAPHIC EQUIPMENT
Bausch & Lomb Optical Co., Rochester,
N. Y.

METERS—Ampere, Tong
Columbia Electric Mfg. Co., 4523 Hamilton
Ave., Cleveland, Ohio.

METERS—Electric Welding
Lincoln Electric Co., The, Cleveland.

METERS—Flow
Brown Instrument Co., The, Philadelphia.

Leeds & Northrup Co., 4956 Stenton Ave.,
Philadelphia.

METERS—Water & Oil
Worthington Pump & Machinery Corp.,
Harrison, N. J.

MICROMETERS—Dial for Sheet Metal
Haines Gauge Co., The, Phila., Pa.

MICRO-PHOTOGRAPHIC EQUIPMENT
Bausch & Lomb Optical Co., Rochester,
N. Y.

MICROSCOPES—Toolmakers
Bausch & Lomb Optical Co., Rochester,
N. Y.

MILLING MACHINES—Automatic
Cincinnati (Ohio) Milling Mch. Co., The.

Kearney & Trecker Corp., Milwaukee.

Potter & Johnston Machine Co., Pawtucket,
R. I.

MILLING MACHINES—Bench
Sundstrand Machine Tool Co., Rockford,
Ill.

MILLING MACHINES—Horizontal
Brown & Sharpe Mfg. Co., Prov., R. I.

Cincinnati (Ohio) Milling Mch. Co., The.

Kearney & Trecker Corp., Milwaukee.

Potter & Johnston Machine Co., Pawtucket,
R. I.

Sundstrand Machine Tool Co., Rockford,
Ill.

Van Norman Machine Tool Co., Spring-
field, Mass.

MILLING MACHINES—Planer Type
Cincinnati (Ohio) Planer Co.

**MILLING MACHINES—Ram Type Uni-
versal**

Van Norman Machine Tool Co., Spring-
field, Mass.

MILLING MACHINES—Second-Hand
(See Clearing House Section)

MILLING MACHINES—Vertical
Brown & Sharpe Mfg. Co., Prov., R. I.

Cincinnati (Ohio) Milling Mch. Co., The.

Kearney & Trecker Corp., Milwaukee.

Potter & Johnston Machine Co., Pawtucket,
R. I.

Reed-Prentice Corp., Worcester, Mass.

MODELS
Barth Stamping & Machine Works, Cleve-
land, Ohio.

MOLDING MACHINES
Tabor Mfg. Co., Phila., Pa.

MONEL METAL
International Nickel Co., Inc., The, 67
Wall St., N. Y. C.

MONORAIL SYSTEMS—Hand & Electric
American Monorail Co., The, Cleveland.

Cleveland Tramrail Div. of The Cleveland
Crane & Engng. Co., Wickliffe, Ohio.

MOTOR-GENERATOR SETS
Crockor-Wheeler Electric Mfg. Co., Am-
pere, N. J.

MOTORS—Electric
Allis-Chalmers Mfg. Co., Milwaukee.

Chicago (Ill.) Electric Co.

Crockor-Wheeler Electric Mfg. Co., Am-
pere, N. J.

General Electric Co., Schenectady, N. Y.

Harnischfeger Corp., 4401 W. National
Ave., Milwaukee.

Lincoln Electric Co., Cleveland.

Westinghouse Elec. & Mfg. Co., E. Pgh.

MOTORS—Electric, Second-Hand
(See Clearing House Section)

NAILS—Wire
American Steel & Wire Co. (U. S. Steel
Corp. Subsidiary), Cleveland.

Columbia Steel Co. (U. S. Steel Corp.
Subsidiary), San Francisco, Calif.

Hassall, John, Inc., Clay & Oakland Sts.,
Bklyn., N. Y.

Pittsburgh (Pa.) Steel Co.

Wickwire Brothers, Cortland, N. Y.

Youngstown (Ohio) Sheet & Tube Co., The

NIBBLING MACHINES
Gray Machine Co., Philadelphia.

NIBS—Lathe & Grinder Center
McKenna Metals Co., Latrobe, Pa.

NICKEL
International Nickel Co., Inc., The, 67
Wall St., N. Y. C.

NITROGEN
Air Reduction Sales Co., 60 East 42nd
St., N. Y. C.

NOZZLES—Sand Blasting
Norton Co., Worcester, Mass.

NUMBERING MACHINES—For Metal
Noble & Westbrook Mfg. Co., The, East
Hartford, Ct.

NUT MACHINERY
Denison Engineering Co., The, Columbus,
Ohio.

**NUT MACHINERY—Automatic Cold
Pressed**

Waterbury (Conn.) Farrel Foundry & Ma-
chine Co., The.

NUT MAKING MACHINERY
National Machinery Co., Tiffin, Ohio.

NUTS—Castellated
Cleveland (Ohio) Cap Screw Co., The.

National Acme Co., The, Cleveland.

Russell, Burdall & Ward Bolt & Nut
Co., Port Chester, N. Y.

NUTS—Lock
Elastic Stop Nut Corp., Elizabeth, N. J.

Standard Pressed Steel Co., Jenkintown,
Pa.

NUTS—Machine Screw
Progressive Mfg. Co., Torrington, Conn.

NUTS—Semi-Finished
Cleveland (Ohio) Cap Screw Co., The.

Russell, Burdall & Ward Bolt & Nut
Co., Port Chester, N. Y.

NUTS—Wing
Parker-Kalon Corp., 200 Varick St.,
N. Y. C.

OIL & GREASE SEALS
Chicago (Ill.) Rawhide Mfg. Co., The.

1306 Elston Ave.

Garlock Packing Co., The, Palmyra, N. Y.

OIL RETAINERS
Chicago (Ill.) Rawhide Mfg. Co., The.

1306 Elston Ave.

OIL STONES
Carborundum Co., The, Niagara Falls,
N. Y.

Norton Co., Worcester, Mass.

OILS—Cutting
Cities Service Oil Co., 60 Wall Tower,
N. Y. C.

Penola, Inc., Pittsburgh.

Shell's Industrial Lubricants Div., Shell
Bldg., San Francisco.

Standard Oil Co. (Indiana), Chicago, Ill.

Sun Oil Co., Philadelphia.

Texas Company, The, 135 East 42nd St.,
N. Y. C.

Tide Water Associated Oil Co., 17 Battery
Place, N. Y. C.

OILS—Fuel
Gulf Oil Corp., Gulf Refining Co., Pitts-
burgh.

Standard Oil Co. (Indiana), Chicago, Ill.

Sun Oil Co., Philadelphia.

Texas Company, The, 135 East 42nd St.,
N. Y. C.

Tide Water Associated Oil Co., 17 Battery
Place, N. Y. C.

OILS—Lubricating
Cities Service Oil Co., 60 Wall Tower,
N. Y. C.

Gulf Oil Corp., Gulf Refining Co., Pitts-
burgh.

Pure Oil Co., The, Chicago.

Shell's Industrial Lubricants Div., Shell
Bldg., San Francisco.

St. Louis, & 50 W. 50th St., N. Y. C.

LELAND-GIFFORD COMPANY

Worcester, Mass.

Drilling Machinery

Belt and Motor Spindle

One to Six Spindles

Tapping Attachments and Multiple Heads

Standard Oil Co. (Indiana), Chicago.
Texas Company, The, 135 East 42nd St.
N. Y. C.
Tide Water Associated Oil Co., 17 Battery
Place, N. Y. C.

OILS—Solvents—See Oils—Cutting

ORE BRIDGES

Dravo Corp., Engineering Wks. Div.,
Pittsburgh.

ORES—Iron

Cleveland-Cliffs Iron Co., The, Cleveland,
Ohio.
Oglebay, Norton & Co., Cleveland.
Pickands Mather & Co., Cleveland.

ORES—Manganese

Cuban-American Manganese Corp., 122
East 42nd St., N. Y. C.
Soyuzgoleksport, Kallaveskaja Ulitsa 5,
Moscow 6, U. S. S. R.

OVENS—Coke and By-Product Recovery
Koppers Co., Engineering & Construction
Div., Pittsburgh.

OVENS—Core and Mold

Herrington & Randall, Inc., Detroit.
Holecraft & Co., Detroit.
Monarch Engineering & Mfg. Co., The,
Baltimore, Md.

OVENS—Enameling and Japanning
Carborundum Co., The, Perth Amboy,
N. J.
Herrington & Randall, Inc., Detroit.

OXY-ACETYLENE—Shape-Cutting Ma-

chines
Air Reduction Sales Co., 60 East 42nd
St., N. Y. C.
Linde Air Products Company, The, 30 East
42nd St., N. Y. C.

OXYGEN

Air Reduction Sales Co., 60 East 42nd
St., N. Y. C.
Linde Air Products Company, The, 30 East
42nd St., N. Y. C.

PACKING—Felt

American Felt Co., 315 Fourth Ave.,
N. Y. C.

PACKING—Leather

Chicago (Ill.) Rawhide Mfg. Co., The,
1306 Elston Ave.
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Locomotive Cylinder
Koppers Co., American Hammered Piston
Ring Div., Baltimore, Md.

PACKING—Metallite

Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Rubber

Goodrich, B. F. Co., The, Akron, Ohio.
Manhattan Rubber Mfg. Div. of Ray-
bestos-Manhattan Inc., The, 2 Townsend
St., Passaic, N. J.

PACKING—Sheet, Asbestos or Rubber
Carey, Philip, Co., The, Cincinnati, Ohio.
Garlock Packing Co., The, Palmyra, N. Y.
Hewitt Rubber Corp., Buffalo, N. Y.
Johns-Manville Corp., 22 East 40th St.,
New York City.

PAINT

Koppers Co., Tar & Chemical Div., Pitts-
burgh, Pa.
National Lead Co., 111 Bldg., N. Y. C.
Sipe, James B., & Co., Pittsburgh.

PARALLELS

Ford Motor Co. (C. E. Johansson Div.),
Dearborn, Mich.

PATTERN WORK—Wood

York (Pa.) Pattern Works

PERFORATED METAL

Chicago Perforating Co., 2440 W 24th
Place, Chicago, Ill.

Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi-
cago.

Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas. & Son, 59 Fairmount
Ave., Jersey City, N. J.

Wickwire Spencer Steel Co., 500 Fifth
Ave., N. Y. C.

PICKLING COMPOUNDS

American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES

Mesta Mch. Co., Pittsburgh.

PICKLING TANK LININGS

National Lead Co., 111 Bldg., N. Y. C.

PICKLING TANK STEAM JETS

Dorton Co., Inc., The, 438 N. Findlay
St., Dayton, Ohio.

PIG IRON

Bethlehem (Pa.) Steel Co.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.

Hanna Furnace Corp., The, Ecorse, De-
troit, Mich.

Jackson (Ohio) Iron & Steel Co., The.

Jones & Laughlin Steel Corp., Pittsburgh.

Pickands Mather & Co., Cleveland.

Republic Steel Corp., Cleveland, Ohio.

Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp. Subsidiary), Birming-
ham, Ala.

PIG IRON—Charcoal

Oglebay, Norton & Co., Cleveland.

PIG IRON CASTING PLANTS

Heyl & Patterson, Inc., Pittsburgh.

PILING—Steel Pipe

National Tube Co. (U. S. Steel Corp.
Subsidiary), Pittsburgh.

PILING—Steel sheet

American Rolling Mill Co., Middletown,
Ohio.

Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.

PINIONS

Waltham (Mass.) Watch Co.

PINIONS—Carbon Hard-surfaced

Foot Bros. Gear & Machine Co., 5301-H
So. Western Blvd., Chicago, Ill.

PINIONS—Rolling Mill

Continental Roll & Steel Foundry Co.,
East Chicago, Ind.

PINIONS—Wire and Rod

Rathbone, A. B. & J., Palmer, Mass.

PIPE—Alloy

National Tube Co. (U. S. Steel Corp. Sub-
sidiary), Pittsburgh.

PIPE—Cast Iron, B. & S. & Flanged

Wood, H. D., & Co., Philadelphia.

PIPE—Lead

National Lead Co., 111 Bldg., N. Y. C.

PIPE—Lead Lined

National Lead Co., 111 Bldg., N. Y. C.

PIPE—New and Second-Hand

Albert & Davidson Pipe Corp., 2nd Ave.,
50-51st St., Bklyn., N. Y.

Greenpoint Iron & Pipe Co., Inc., 340
Stagg St., Bklyn., N. Y.

PIPE—Rubber Covered

Goodrich, B. F. Co., The, Akron, Ohio.

PIPE—Seamless Brass or Copper

American Brass Co., The, Waterbury,
Conn.

PIPE—Seamless Steel

National Tube Co. (U. S. Steel Corp. Sub-
sidiary), Pittsburgh.

PIPE—Spiral Welded

American Rolling Mill Co., Middletown, O.
Crane Co., Chicago.

PIPE—Standard, Black and Galvanized

Bethlehem (Pa.) Steel Co.

Jones & Laughlin Steel Corp., Pittsburgh.

National Tube Co. (U. S. Steel Corp.
Subsidiary), Pittsburgh.

Republic Steel Corp., Cleveland, Ohio.

Youngstown (Ohio) Sheet & Tube Co., The.

PIPE—Welded, Electric

National Tube Co. (U. S. Steel Corp.
Subsidiary), Pittsburgh.

Republic Steel Corp., Cleveland, Ohio.

PIPE COVERING—Asbestos

Johns-Manville Corp., 22 East 40th St.,
New York City.

PIPE FITTINGS

Crane Co., Chicago.

Jarecki Mfg. Co., Erie, Pa.

PIPE THREADING & CUTTING MA-

CHINES
Cox & Sons Co., The, Bridgeton, N. J.

Jarecki Mfg. Co., Erie, Pa.

Landis, Mach. Co., Inc., Waynesboro, Pa.

Merrell Mfg. Co., Toledo.

Murphy Machine & Tool Co., Detroit,
Mich.

Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PISTON RINGS

Koppers Co., American Hammered Piston
Ring Div., Baltimore, Md.

PLANERS

Cincinnati (Ohio) Planer Co.

PLANERS—Hydraulic

Rockford (Ill.) Machine Tool Co.

PLANERS—Plate

Cleveland (Ohio) Punch & Shear Works
Co., The.

PLANERS—Rotary

Cleveland (Ohio) Punch & Shear Works
Co., The.

Espen-Lucas Mch. Wks., Philadelphia.

PLANING MACHINES—Second Hand.

(See Clearing House Section)

PLASTICS—Laminated

Bakelite Corp., 247 Park Ave., New York
City.

PLASTICS—Moulded

Bakelite Corp., 247 Park Ave., New York
City.

Continental-Diamond Fibre Co., Newark,
Delaware.

PLASTICS—Synthetic

Bakelite Corp., 247 Park Ave., New York
City.

PLASTER'S CLEANING COMPOUND

American Chemical Paint Co., Ambler, Pa.

PLATES—Floor or Ceiling Door

Alan Wood Steel Co., Conshohocken, Pa.

Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.

Inland Steel Co., Chicago.

PLATES—Iron or Steel

Alan Wood Steel Co., Conshohocken, Pa.

American Rolling Mill Co., Middletown, O.

Bethlehem (Pa.) Steel Company.

Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.

Granite City (Ill.) Steel Co.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Ryerson, Joseph T., & Son, Inc., Chicago.

Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp. Subsidiary), Birming-
ham, Ala.

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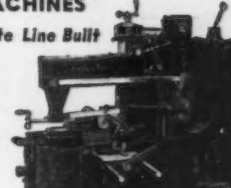
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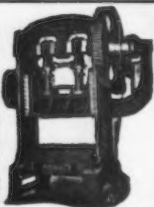
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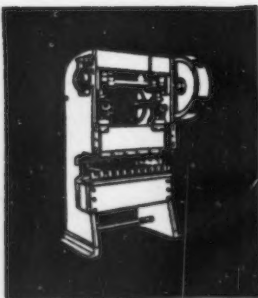
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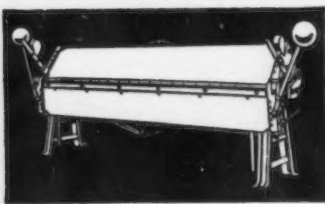
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National Machinery Co., Tiffin, Ohio.

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Lake Erie Engineering Corp., 68 Kenmore St., Buffalo, N. Y.

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PRESSES—Embossing

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Mesta Mch. Co., Pittsburgh.

Morgan Engineering Co., The, Alliance, O.

Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.

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PUMPS—Steam

Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Vacuum

Worthington Pump & Machinery Corp., Harrison, N. J.

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Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

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Cleveland (Ohio) Punch & Shear Works Co., The.
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Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

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Rustless Iron & Steel Corp., Baltimore, Md.

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American Brass Co., The, Waterbury, Conn.

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Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

Lincoln Electric Co., The, Cleveland.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

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& Plain
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N. Y. C.

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bestos-Manhattan Inc., The, 2 Townsend
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Parker Rust Proof Co., 2186 Milwaukee
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SAWS—Friction
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Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Hack Saw Blades
Atkins, E. C. & Co., Indianapolis, Ind.
Millers Falls Co., Greenfield, Mass.

SAWS—Hot Metal
Ajax Mfg. Co., The, Cleveland.
Atkins, E. C. & Co., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Inserted Tooth, Cold
Atkins, E. C. & Co., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia.
Tabor Mfg. Co., Philadelphia.

SAWS—Milling
Atkins, E. C. & Co., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Screw Slotting
Atkins, E. C. & Co., Indianapolis, Ind.
Harber-Colman Co., Rockford, Ill.

SCALES
Streeter-Amet Co., Chicago.

SCREENS—Perforated Metal
Chicago Perforating Co., 2440 W. 24th
Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi-
cago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount
Ave., Jersey City, N. J.

SCREENS—Woven Wire
Ludlow-Saylor Wire Co., St. Louis, Mo.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth
Ave., N. Y. C.

SCREW MACHINE PRODUCTS
Blake & Johnson Co., The, Waterville,
Conn.
Commonwealth Brass Corp., Detroit.
Defiance Screw Machine Prods Div. of
The Serrick Corp., Defiance, Ohio.
Eastern Mch. Screw Corp., New Haven, Ct.
Mid-West Screw Products Co., 20 St.
George St., St. Louis, Mo.
Miles, Franklin S., 2422-25 N. Mather St.,
Phila., Pa.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The
New Britain Machine Co., New Britain,
Conn.
Northwest Automatic Products Corp., Min-
neapolis, Minn.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Peck Spring Co., The, Plainville, Conn.

Shimer, Samuel J. & Sons, Inc., Milton,
Pa.
Waltham (Mass.) Watch Co.

SCREW MACHINE REBUILDING
Modern Collet & Mch. Co., Ecorse, Detroit,
Mich.

SCREW MACHINERY—Automatic
Brown & Sharpe Mfg. Co., Providence
R. I.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The
New Britain Machine Co., New Britain,
Conn.

SCREW MACHINERY—Hand
Warner & Swasey Co., The, Cleveland.

SCREW MACHINERY—Multiple Spindle
Acme Machine Tool Co., The, Cincinnati,
Ohio.
National Acme Co., The, Cleveland.

SCREW STOCK
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Union Drawn Steel Div. Republic Steel
Corp., Massillon, Ohio.

SCREWS—Cap
Cleveland (Ohio) Cap Screw Co., The,
Mid-West Screw Products Co., 20 St.
George St., St. Louis, Mo.
National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Triplex Screw Co., Cleveland.

SCREWS—For Sheet Metal
Parker-Kalon Corp., 200 Varick St., New
York City.

SCREWS—Hardened Metallic Drive
Parker-Kalon Corp., 200 Varick St., New
York City.

SCREWS—Machine
Blake & Johnson Co., The, Waterville,
Conn.
Progressive Mfg. Co., The, Torrington, Ct.
Shimer, Samuel J. & Sons, Inc., Milton,
Pa.
Triplex Screw Co., Cleveland.

SCREWS—Machine, Recessed Head
American Screw Co., Providence, R. I.

SCREWS—Safety Set
Parker-Kalon Corp., 200 Varick St.,
N. Y. C.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Set
Cleveland (Ohio) Cap Screw Co., The,
National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS—Sheet Metal, Recessed Head
American Screw Co., Providence, R. I.

SCREWS, Socket Head Cap
Parker-Kalon Corp., 200 Varick St.,
N. Y. C.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Wood, Recessed Head
American Screw Co., Providence, R. I.

SCRIBERS
Ford Motor Co. (C. E. Johansson Div.),
Dearborn, Mich.

SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren,
Ohio.

SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N. Y.

**SECOND - HAND MACHINERY—(See
Clearing House Section)**

SEPARATORS—Magnetic
Dings Magnetic Separator Co., 727 Smith
St., Milwaukee.
Kiekhafer Corp., Cedarburg, Wis.
Ohio Electric Mfg. Co., The, 5908 Maurice
Ave., Cleveland.
Stearns Magnetic Mfg. Co., 635 So. 28th
St., Milwaukee.

SHAFTING—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Union Drawn Steel Div. Republic Steel
Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

SHAFTING—Steel
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Union Drawn Steel Div. Republic Steel
Corp., Massillon, Ohio.

SHAFTING—Turned and Ground
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Byerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel
Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

SHAFTS—Carbon Hard-surfaced
Foote Bros. Gear & Machine Co., 5301-H
So. Western Blvd., Chicago, Ill.

SHAPER PLANERS—Hydraulic
Rockford (Ill.) Machine Tool Co.

SHAPERS
Cincinnati (Ohio) Shaper Co., The.
Hendey Machine Co., Torrington, Conn.
Smith & Mills Co., Cincinnati, Ohio.

SHAPERS—Hydraulic
Rockford (Ill.) Machine Tool Co.

SHAPERS—Vertical
Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

SHAPERS—Vertical Hydraulic
Rockford (Ill.) Machine Tool Co.

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SHAPES—Cold Drawn

Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

SHEAR BLADES & KNIVES

American Shear Knife Co., Homestead, Pa.
Atkins, E. C. & Co., Indianapolis, Ind.
Canton Fdry. & Mch. Co., Cleveland.
Cleveland (Ohio) Punch & Shear Works Co., The.

SHEARING MACHINES—Alligator

Canton Fdry. & Mch. Co., Cleveland.

SHEARING MACHINES—Angle, Hand and Power

Cleveland (Ohio) Punch & Shear Works Co., The.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.

SHEARING MACHINES—Billet

Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cleveland (Ohio) Punch & Shear Works Co., The.

SHEARING MACHINES—Beam and Channel

Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Continuous Sheet & Pack

Cleveland (Ohio) Punch & Shear Works Co., The.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Billet

Morgan Engineering Co., The, Alliance, O.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Continuous Sheet & Pack

Cleveland (Ohio) Punch & Shear Works Co., The.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Plate

Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.

SHEARING MACHINES—Plate

Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, Buffalo, N. Y.

SHEARING MACHINES—Plate

Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Sheet and Plate

Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.
Niagara Mach. & Tool Wks., Buffalo, N. Y.

SHEET BARS

Andrews Steel Co., The, Newport, Ky.

SHEET LIFTERS

Cullen-Friedrich Co., 1303 S. Kilbourn Ave., Chicago.

J-B Engineering Sales Co., 1738 Orange St., New Haven, Conn.

SHEET METAL MACHINERY

Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.
Dreis & Krump Mfg. Co., Chicago.

Ferracute Machine Co., Bridgeton, New Jersey.

New Albany (Ind.) Mch. Mfg. Co.

Niagara Mach. & Tool Wks., Buffalo, N. Y.
Y & O Press Co., Hudson, N. Y.

Waterbury (Conn.) Farrel Foundry & Machine Co., The.

SHEETS—Aluminum

Aluminum Co. of America, Pittsburgh.

SHEETS—Auto Body

American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Inland Steel Co., Chicago.

Republic Steel Corp., Cleveland, Ohio.

Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Black

American Rolling Mill Co., Middletown, O.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

Granite City (Ill.) Steel Co.

Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Newport (Ky.) Rolling Mill Co., The.

Div. of The Andrews Steel Co.

Republic Steel Corp., Cleveland, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago.

Scull Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.

Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Weirton (W. Va.) Steel Co.

SHEETS—Blue Annealed

Alan Wood Steel Co., Conshohocken, Pa.

American Rolling Mill Co., Middletown, O.

Bethlehem (Pa.) Steel Co.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Ryerson, Jos. T. & Son, Inc., Chicago.

Worth Steel Co., Claymont, Del.

SHEETS—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze

American Brass Co., The, Waterbury, Conn.

SHEETS—Chrome

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Chrome Nickel

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Chromium Plated

American Nickeloid Co., 1312 Second St., Peru, Ill.

SHEETS—Coated

American Nickeloid Co., 1312 Second St., Peru, Ill.

SHEETS—Cold Rolled

American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Great Lakes Steel Corp., Ecorse, Detroit.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Republic Steel Corp., Cleveland, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago.

Weirton (W. Va.) Steel Co.

SHEETS—Copper Alloy

American Brass Co., The, Waterbury, Conn.

SHEETS—Copper Steel

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Inland Steel Co., Chicago.

SHEETS—Electrical

American Rolling Mill Co., Middletown, O.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Great Lakes Steel Corp., Ecorse, Detroit.

Newport (Ky.) Rolling Mill Co., The.

Div. of The Andrews Steel Co.

Republic Steel Corp., Cleveland, Ohio.

SHEETS—Enameling

American Rolling Mill Co., Middletown, O.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

Granite City (Ill.) Steel Co.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Newport (Ky.) Rolling Mill Co., The.

Div. of The Andrews Steel Co.

SHEETS—For Drawing and Stamping

American Rolling Mill Co., Middletown, O.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Newport (Ky.) Rolling Mill Co., The.

Div. of The Andrews Steel Co.

Republic Steel Corp., Cleveland, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago.

Superior Sheet Steel Co., Canton, Ohio.

Worth Steel Co., Claymont, Del.

SHEETS—Full Finished

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Republic Steel Corp., Cleveland, Ohio.

SHEETS—Galvanized, Flat and Corrugated

American Rolling Mill Co., Middletown, O.

Bethlehem (Pa.) Steel Co.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

Continental Steel Corp., Kokomo, Ind.

Granite City (Ill.) Steel Co.

Great Lakes Steel Corp., Ecorse, Detroit.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Newport (Ky.) Rolling Mill Co., The.

Div. of The Andrews Steel Co.

Republic Steel Corp., Cleveland, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago.

Superior Sheet Steel Co., The, Canton, Ohio.

Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Weirton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Galvanized

Newport (Ky.) Rolling Mill Co., The.

Div. of The Andrews Steel Co.

Superior Sheet Steel Co., The, Canton, Ohio.

SHEETS—Hot Rolled

Superior Sheet Steel Co., The, Canton, Ohio.

SHEETS—Hot Rolled Pickled

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Newport (Ky.) Rolling Mill Co., The.

Div. of The Andrews Steel Co.

Superior Sheet Steel Co., The, Canton, Ohio.

SHEETS—Lead

National Lead Co., 111 Bdw., N. Y. C.

SHEETS—Long Term

American Rolling Mill Co., Middletown, Ohio.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Newport (Ky.) Rolling Mill Co., The.

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Superior Sheet Steel Co., The, Canton, Ohio.

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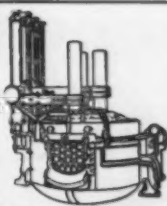
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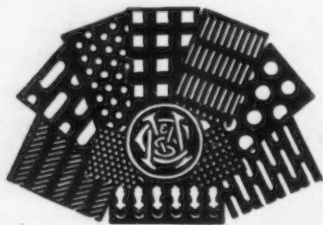
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Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
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Marion (Ohio) Steam Shovel Co.
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- SILICON METAL & ALLOYS**
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
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- SOLDER—Flux-Filled**
Gardner Metal Co., 4884 S. Campbell Ave., Chicago.
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- Coulter, James, Machine Co., The, Bridgeport, Conn.**
- Denison Engineering Co., The, Columbus, Ohio.**
- Eastern Tool & Mfg. Co., Bloomfield, N. J.**
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- Morgan Engineering Co., The, Alliance, O.**
- Nilson, A. H., Machine Co., Bridgeport, Conn.**
- Shuster, F. B., Co., The, New Haven, Conn.**
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- Wood, R. D., & Co., Philadelphia.**
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- Poole Foundry & Mch. Co., Baltimore, Md.**
- Twin Disc Clutch Co., Racine, Wis.**
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- Jones & Laughlin Steel Corp., Pittsburgh.**
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- (U. S. Steel Corp. Subsidiary)**
- Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.**
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Balrd Mch. Co., The, Bridgeport, Conn.
- Torrington (Conn.) Mfg. Co., The.**
- SPRINGS—Car**
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
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- Amer. Spring & Mfg. Corp., Holly, Mich.**
- American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.**
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- Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.**
- Collins Supply & Equipment Co., Scranton, Pa.**
- Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.**
- Cuyahoga Spring Co., The, Cleveland.**
- Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.**
- Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.**
- Hubbard, M. D., Spring Co., 749 Central Ave., Pontiac, Mich.**
- Hunter Pressed Steel Co., Lansdale, Pa.**
- Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.**
- Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.**
- Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.**
- U. S. Steel Wire Spring Co., Cleveland, O.**
- Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.**
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Baldwin-Duckworth Div. of Chain Belt Co., Springfield, Mass.
- Morse Chain Co., Ithaca, N. Y.**
- Whitney Chain & Mfg. Co., Hartford, Ct.**
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- Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.**
- Crosby Co., The, Buffalo, N. Y.**
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- Dinsmore & Jager, Northampton, Mass.**
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- Eastern Tool & Stpg. Co., Inc., Saugus, Mass.**
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- Wagner Specialty Co., Burlington, Wis.**
- Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.**
- Worcester (Mass.) Pressed Steel Co., 104 Barber Ave.**
- Worcester (Mass.) Stamped Metal Co., 6 Hunt St.**
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- Titchener, E. H., & Co., Binghamton, N. Y.**
- Wickwire Brothers, Cortland, N. Y.**
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Durlon Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
- STEEL—Alloy**
Alan Wood Steel Co., Conshohocken, Pa.
- Allegheny Ludlum Steel Corp., Pittsburgh, Pa.**
- Andrews Steel Co., The, Newport, Ky.**
- Bethlehem (Pa.) Steel Company.**
- Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.**
- Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.**
- Harrisburg (Pa.) Steel Corp.**
- Ingersoll Steel & Disc Div., Borg-Warner Corp., Chicago.**
- Republic Steel Corp., Cleveland, Ohio.**
- Ryerson, Jos. T., & Son, Inc., Chicago.**
- Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.**
- Timken Roller Bearing Co., The, Canton, O.**
- Timken Steel & Tube Div., The, Timken Roller Bearing Co., Canton, O.**
- Vanadium-Alloys Steel Co., Latrobe, Pa.**
- Wheeler, Lovejoy & Co., Inc., Cambridge, Mass.**
- Youngstown (Ohio) Sheet & Tube Co., The.**
- STEEL—Alloy, Cold Drawn**
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
- LaSalle Steel Co., Chicago.**
- Monarch Steel Co., Indianapolis, Ind.**

PRODUCTS INDEX

Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Bright Finished
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

STEEL—Carbon
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

STEEL—Carbon Hard-surfaced
Foote Bros. Gear & Machine Co., 5301-B So. Western Blvd., Chicago, Ill.

STEEL—Case Hardening
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Monarch Steel Co., Indianapolis, Ind.

STEEL—Chrome Molybdenum
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Chrome Nickel
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Chrome Nickel Silver
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

STEEL—Cobalt
Darwin & Milner, Inc., Cleveland.

STEEL—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Rathbone, A. B. & J. Palmer, Mass.
Ryerson, Joseph T. & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Cold Rolled Strips
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Bethlehem (Pa.) Steel Co.
Griffin Mfg. Co., Erie, Pa.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T. & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Superior Steel Corp., Carnegie, Pa.
Thomas Steel Co., The, Warren, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.
Worcester (Mass.) Pressed Steel Co., 104 Barber Ave.

STEEL—Cold Rolled Strips—Electro Brass Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Copper Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro-Galvanized Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Tin Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Zinc Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Stainless
Griffin Mfg. Co., Erie, Pa.

STEEL—Corrosion Resisting
Midvale Co., The, Nicetown, Phila., Pa.
Rustless Iron & Steel Corp., Baltimore, Md.

STEEL—Crucible
Superior Steel Corp., Carnegie, Pa.

STEEL—Crucible
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Crucible
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.

STEEL—Crucible
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Crucible
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—Crucible
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Crucible
Diston, Henry, & Sons, Inc., Philadelphia.
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.

STEEL—Crucible
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Crucible
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—Crucible
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Crucible
Diston, Henry, & Sons, Inc., Philadelphia.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—High Speed
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—High Speed
Cleveland (Ohio) Twist Drill Co., The, Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—High Speed
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

STEEL—High Speed
Latrobe (Pa.) Electric Steel Co.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strips
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

STEEL—Hot Rolled Strips
Great Lakes Steel Corp., Ecorse, Detroit.
Inland Steel Co., Chicago.

STEEL—Hot Rolled Strips
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Republic Steel Corp., Cleveland, Ohio.

STEEL—Hot Rolled Strips
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.

STEEL—Hot Rolled Strips
Stanley Works, The, New Britain, Conn.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

STEEL—Hot Rolled Strips
Superior Steel Corp., Carnegie, Pa.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.
Pittsburgh (Pa.) Steel Co.

STEEL—Open Hearth
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Open Hearth
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—Open Hearth
Griffin Mfg. Co., Erie, Pa.

STEEL—Open Hearth
Rustless Iron & Steel Corp., Baltimore, Md.

STEEL—Open Hearth
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.

STEEL—Open Hearth
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.

STEEL—Open Hearth
Monarch Steel Co., Indianapolis, Ind.
Timken Roller Bearing Co., The, Canton, O.

STEEL—Open Hearth
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Open Hearth
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

STEEL—Open Hearth
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Open Hearth
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.

STEEL—Open Hearth
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.

STEEL—Open Hearth
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Open Hearth
Harrisburg (Pa.) Steel Corp.

STEEL—Open Hearth
Republic Steel Corp., Cleveland, Ohio.

STEEL—Open Hearth
Timken Roller Bearing Co., The, Canton, O.

STEEL—Open Hearth
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Open Hearth
Youngstown (Ohio) Sheet & Tube Co., The.

STEEL—Stainless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—Stainless
American Rolling Mill Co., Middletown, O.

STEEL—Stainless
Bethlehem (Pa.) Steel Company.

STEEL—Stainless
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

STEEL—Stainless
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Stainless
Diston, Henry, & Sons, Inc., Philadelphia.

STEEL—Stainless
Latrobe (Pa.) Electric Steel Co.

STEEL—Stainless
Republic Steel Corp., Cleveland, Ohio.

STEEL—Stainless
Rustless Iron & Steel Corp., Baltimore, Md.

STEEL—Stainless
Ryerson, Jos. T. & Son, Inc., Chicago.

STEEL—Stainless
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.

STEEL—Stainless
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

STEEL—Stainless
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Stainless
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

STEEL—Tool
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—Tool
Bethlehem (Pa.) Steel Company.

STEEL—Tool
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Tool
Darwin & Milner, Inc., Cleveland.

STEEL—Tool
Diston, Henry, & Sons, Inc., Philadelphia.

STEEL—Tool
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL—Tool
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

STEEL—Tool
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.

STEEL—Tool
Midvale Co., The, Nicetown, Phila., Pa.

STEEL—Tool
Ryerson, Jos. T. & Son, Inc., Chicago.

STEEL—Tool
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

STEEL—Tool
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Tool
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Tool
Detroit (Mich.) Alloy Steel Co.

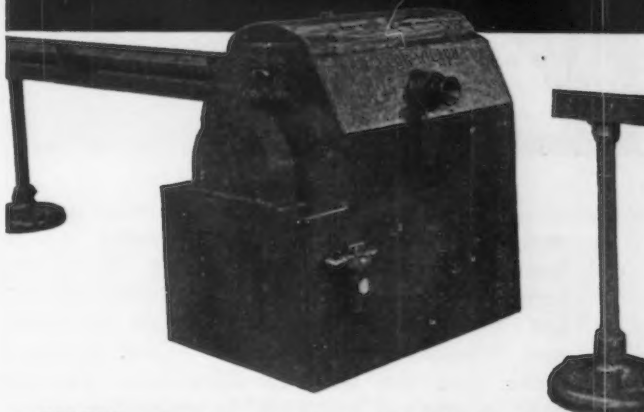
STEEL—Tool
STEEL MILL EQUIPMENT

STEEL—Tool
Wellman Engineering Co., The, Cleveland

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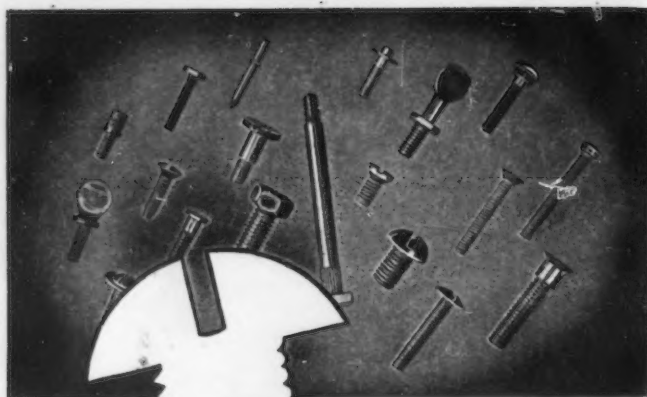
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For all mechanical purposes up to and including 9/16 gage round or square wire.

PRODUCTS INDEX

STEEL PLANTS AND ROLLING MILLS
Barnett, H. A., & Co., Chicago, Ill.

STEEL ROLLS
Continental Roll & Steel Foundry Co., East Chicago, Ind.

United Engineering & Fdry. Co., Pgh.

STOKERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

Whiting Corp., Harvey, Ill.

STOP WATCHES
Stillman, M. J., Co., Inc. Chicago.

STRAIGHT EDGES
Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.

STRAIGHTENING AND DRAWING MACHINES—For Bars
Ajax Mfg. Co., The, Cleveland.

STRAIGHTENING MACHINES—Bar & Tube
Medart Co., The, St. Louis, Mo.

STRAIGHTENING MACHINES—Wire
Lewis Machine Co., The, Cleveland.

Shuster, F. B., Co., The, New Haven, Conn.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

Bethlehem (Pa.) Steel Co.

Morgan Engineering Co., The, Alliance, O.

STRUCTURAL STEEL—See Angles, Beams, Channels and Tees

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

SWAGING MACHINES
Torrington (Conn.) Company.

SWITCHES—Electric
Westinghouse Elec. & Mfg. Co., East Pgh.

TANK LININGS
Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.

TANK LININGS—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Compressed Air, Gas, Oil and Water
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

TANKS—Iron and Steel
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

TANKS—Pickling
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Cleveland (Ohio) Quarries Co., The.

Goodrich, B. F., Co., The, Akron, Ohio.

Haveg Corp., Newark, Delaware.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

TANKS—Rubber Lined
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Goodrich, B. F., Co., The, Akron, Ohio.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Welded
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

TAPPING MACHINES
Baker Bros. Inc., Toledo, Ohio.

Barnes Drill Co., 815-831 Chestnut St., Rockford, Ill.

National Automatic Tool Co., Richmond, Ind.

Waterbury (Conn.) Farrel Fdry. & Mch. Co.

TAPPING MACHINES—Nuts
National Machinery Co., Tiffin, Ohio.

TAPS—Collapsing
Geometric Tool Co., The, New Haven, Conn.

Landis Mch. Co., Inc., Waynesboro, Pa.

National Acme Co., The, Cleveland.

TAPS AND DIES
Greenfield (Mass.) Tap & Die Corp.

Landis Mch. Co., Inc., Waynesboro, Pa.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

Victor Machinery Exchange, 251 Centre St., N. Y. C.

TEES—See Angles, Beams, Channels and Tees

TERMINALS—Plain & Lock
Thompson-Bremer & Co., Chicago.

TERNE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

TESTING MACHINES—Hardness
Shore Instrument & Mfg. Co., Inc., The, Jamaica, L. I., N. Y.

TESTING MACHINES—Materials
Baldwin-Southwark Corp., Southwark Div., Phila.

THERMOMETERS
Weston Electrical Instrument Corp., New York, N. Y.

THERMOMETERS—Recording
Brown Instrument Co., The, Philadelphia.

Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

THREAD CUTTING TOOLS—See Dies, Taps

THREAD ROLLING MACHINES
Nilson, A. H., Mch. Co., Bridgeport, Ct.

Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

THREADING MACHINES
Eastern Mch. Screw Corp., New Haven, Conn.

Geometric Tool Co., The, New Haven, Conn.

Landis Mch. Co., Inc., Waynesboro, Pa.

National Machinery Co., Tiffin, Ohio.

THREADING MACHINES—Automatic
Landis Mch. Co., Inc., Waynesboro, Pa.

TIE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

TIMING INSTRUMENTS
Stillman, M. J., Co., Inc., Chicago.

TIN PLATE
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Republic Steel Corp., Cleveland, Ohio.

Weirton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co., The.

TIN PLATE MACHINERY
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TIPS—Spot Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

TOOL BIT TIPS—Hard Carbide
McKenna Metals Co., Latrobe, Pa.

TOOL BITS
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.

Gairing Tool Co., The, Detroit.

Gisholt Machine Co., Madison, Wisconsin.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.

Gairing Tool Co., The, Detroit.

Gisholt Machine Co., Madison, Wisconsin.

TOOLS—Hard Carbide Tipped
McKenna Metals Co., Latrobe, Pa.

TOOLS—Lathes
Armstrong Bros. Tool Co., Chicago.

Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.

Gisholt Machine Co., Madison, Wisconsin.

TOOLS—Metal Cutting
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.

Michigan Tool Co., Detroit, Mich.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

TOOLS—Steel Cutting
McKenna Metals Co., Latrobe, Pa.

TOOLS—Tungsten Carbide
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.

TORCHES—Brazing, Cutting and Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

TRACTORS AND TRAILERS—See Trucks, Tractors and Trailers—Industrial

TRAILERS—Industrial—See Trucks, Tractors and Trailers—Industrial

TRAMRAILS—Overhead Systems
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

TRAMWAYS—Wire Rope
Leschen, A., & Sons Rope Co., St. Louis, Mo.

TRANSCRIBING MACHINES
Dictaphone Corp., 420 Lexington Ave., N. Y. C.

TRANSMISSIONS—Hydraulic
American Engineering Co., Philadelphia.

Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

TRANSMISSIONS—Variable Speed
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

Link-Belt Co., 2045 West Hunting Park Ave., Phila., Pa.

Reeves Pulley Co., Columbus, Indiana.

TRAPS—Steam
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

TREADS—Safety
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Hendrick Mfg. Co., Carbondale, Pa.

Kerlow Steel Flooring Co., Jersey City, N. J.

Norton Co., Worcester, Mass.

TROLLEYS
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.

TRUCKS—Dump (Industrial)
Towmotor Co., 1231 East 152nd St., Cleveland.

TRUCKS—Elevating (Power)
Baker-Rauflang Co., The, 2175 W. 35th St., Cleveland.

Elwell-Parker Electric Co., The, Cleveland.

Towmotor Co., 1231 East 152nd St., Cleveland.

Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

PRODUCTS INDEX

TRUCKS—Lift (Hand & Foot)
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Scoop (Industrial)
Towmotor Co., 1231 East 152nd St., Cleveland.

TRUCKS—Shop, Hand
Lansing (Mich.) Company.

TRUCKS, TRACTORS AND TRAILERS—Industrial
Atlas Car & Mfg. Co., The, Cleveland.
Baker-Hausling Co., The, 2175 W. 25 St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.
Lansing (Mich.) Company.
Towmotor Co., 1231 East 152nd St., Cleveland.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TUBE MILL MACHINERY
Continental Roll & Steel Foundry Co., Industrial Equipment Div., East Chicago, Ind.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Torrington (Conn.) Mfg. Co., The.
United Engineering & Fdry. Co., Pith.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

TUBE MILL MACHINERY—Welded
Continental Roll & Steel Foundry Co., Industrial Equipment Div., East Chicago, Ind.
McKay Machine Co., The, Youngstown, Ohio.

TUBES—Boiler
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBES—Copper Alloy
American Brass Co., The, Waterbury, Conn.

TUBES—High Carbon
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBES—Nickel Silver
American Brass Co., The, Waterbury, Conn.

TUBES—Stainless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ryerson Jos. T. & Son, Inc., Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.

TUBING—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.

TUBING—Nichrome
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

TUBING—Open Seam
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.

TUBING—Seamless Steel
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.
Pittsburgh (Pa.) Steel Co.
Ryerson Jos. T. & Son, Inc., Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBING—Square and Rectangular
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Stainless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Tinned Brass or Copper
Bundy Tubing Co., Detroit, Mich.

TUBING—Tinned-Steel
Bundy Tubing Co., Detroit, Mich.

TUBING—Welded Steel
Bundy Tubing Co., Detroit, Mich.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBULAR PRODUCTS
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUMBLING BARRELS—See Barrels—Tumbling

TUNGSTEN METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Malloy, P. R. & Co., Inc., Indianapolis, Ind.

TUNGSTEN CARBIDE
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.

Firth-Sterling Steel Co., McKeesport, Pa.

TURBINE-GENERATORS—Steam
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TURNBUCKLES
Laughlin, Thomas, Co., The, Portland, Maine.

TURNABLES
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

TURNABLES—Industrial
Canton Fdry. & Mch. Co., Cleveland.
Whiting Corp., Harvey, Ill.

TWIST DRILLS
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Victor Machinery Exchange, 251 Centre St., N. Y. C.

TYPE—Steel
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

UNCOILERS—Processing
Cleveland (Ohio) Punch & Shear Works Co., The.
McKay Machine Co., The, Youngstown, Ohio.

UNIONS
Crane Co., Chicago.

UNIT HEATERS—Electric
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.

VALVES—Acid Resisting
Durlon Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
National Lead Co., 111 Bdwy., N. Y. C.

VALVES—Air Blast for Presses
Little, F. J., Mch. Co., Chicago.

VALVES—Air & Hydraulic Control
Brown Instrument Co., The, Philadelphia.
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.
Nicholson, W. H. & Co., 185 Oregon St., Wilkes-Barre, Pa.
Tomkins-Johnson Co., The, Jackson, Mich.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

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Brown Instrument Co., The, Philadelphia.
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Wood, R. D. & Co., Philadelphia.

VALVES—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Crane Co., Chicago.
Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.
Wood, R. D. & Co., Philadelphia.

VALVES—Proportioning
Brown Instrument Co., The, Philadelphia.

VALVES—Pump, Rubber
Garlock Packing Co., The, Palmyra, N. Y.

VANADIUM
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Jarecki Mfg. Co., Erie, Pa.

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Hendey Machine Co., Torrington, Conn.

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Sessions, J. H. & Son, Hooker Court, Bristol, Conn.
Shakenproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.

WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

WASHERS—Lock
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Butcher & Hart Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.
Shakenproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
Spring Washer Industry, 616 Wrigley Bldg., Chicago, Ill.
Thompson-Bremer & Co., Chicago.
Washburn Co., The, Worcester, Mass.
WASHERS—Special
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WASHERS—Special Sizes
H. K. Metal Craft Mfg. Corp., 388 Second Ave., N. Y. C.
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Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
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WELDING—Electric
Lincoln Electric Co., The, Cleveland.
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- 1—16"x48" CINCINNATI, M.D.
- 1—12"x24" CINCINNATI, M.D.
- 1—12"x48" CINCINNATI, M.D.
- 1—10"x36" THOMPSON.
- 1—No. 2 CINCINNATI 12"x36".
- 1—No. 2 LANDIS 12"x32".
- 1—No. 4 LANDIS 12"x66".

GRINDERS (Centerless)

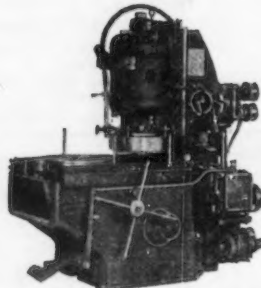
- 5—No. 2 CINCINNATI, M.D.

GRINDERS (Internal)

- 2—No. 24 BRYANT HYDR. DEEP HOLE.
- 13—No. 12A BRYANT 2-SPDL. HOLE & FACE.
- 2—No. 12 BRYANT.
- 3—No. 3 BRYANT.
- 1—No. 18 BRYANT.
- 1—No. 11 GIDDINGS & LEWIS TEROMATIC.
- 1—No. 52 GREENFIELD HYDROIL.
- 1—No. 50 HEALD HYDR.
- 1—No. 60 HEALD.
- 2—No. 65 HEALD.
- 1—No. 70 HEALD.
- 1—No. 72 HEALD.
- 1—No. 72 HEALD SIZE-MATIC.
- 2—No. 72A3 HEALD SIZE-MATIC.
- 3—No. 72A3 HEALD GAGE-MATIC.
- 3—No. 75 HEALD.
- 1—No. 85 HEALD.
- 1—No. 103 RIVETT.

GRINDERS (Miscellaneous)

- 3—No. 3 BARBER COLMAN HOB.
- 1—UNION HOB.
- 1—No. 4 BARBER COLMAN HOB.
- 1—No. 42 VAN NORMAN RADIUS.
- 4—No. 32 VAN NORMAN RADIUS.
- 2—No. 10 HANCHETT SAW.
- 2—No. 40A MACHY, CO. BAND SAW.
- 1—No. 71B HANCHETT CIRCLE SAW.
- 9—FITCHBURG HYD. SPLINE.
- 2—P & W WORM.
- 2—12-spindle DEFIANCE VALVE.
- 2—No. 2A WYCO FLEX. SHAFT (new).
- 1—2-spindle MILWAUKEE COCK.
- 1—EX-CELL-O GAGE.
- 1—SPRINGFIELD GAGE.



GRINDERS (Vertical Surface)

- 5—No. 16 BLANCHARD, M.D.
- 2—No. 16 BLANCHARD, B.D.
- 1—No. 16A BLANCHARD AUTO., M.D.
- 1—No. 27 BLANCHARD, 60" chuck.
- 1—No. 10 BLANCHARD, B.D.
- 4—14" PRATT & WHITNEY, M.D.
- 3—14" PRATT & WHITNEY, MODEL B.
- 1—8" PRATT & WHITNEY.

GRINDERS (Rotary Surface)

- 4—No. 25A HEALD HYDR., M.D.
- 1—No. 20 HEALD (8") M.D.
- 2—No. 22 HEALD, M.D.
- 1—No. 255 HEALD.
- 1—12" ARTER, M.D.

GRINDERS (Plain Surface)

- 2—No. 3 ABRASIVE, M.D.
- 1—No. 5 ABRASIVE, M.D.
- 2—No. 33 ABRASIVE.
- 1—TYPE 110" BRIDGEPORT KNIFE, M.D.
- 1—No. 8 BADGER.
- 3—No. 2 BROWN & SHARPE, M.D.
- 1—84" DIAMOND.
- 1—TYPE F DIAMOND, M.D.
- 1—No. 4 DIAMOND, M.D.
- 2—No. 1 GARDNER HYDR., M.D.
- 1—No. 96-30" GARDNER HYDR., M.D.
- 1—TYPE G NORTON, M.D. 6"x10"x36".
- 1—No. 4 REID HYDR., M.D. 20"x24"x60".
- 1—No. 78 WILMARTH & MORMAN, M.D.
- 1—No. 38 COVEL HANCHETT HYDR., M.D.
- 1—No. 78 COVEL HANCHETT HYDR., M.D.
- 1—30"x18"x6" SPRINGFIELD PLANNER TYPE, M.D.

GRINDERS (Tool & Cutter)

- 5—No. 13 BROWN & SHARPE.
- 2—No. 2 BATH.
- 1—No. 1 1/2 CINCINNATI.
- 1—GISHOLT TUB.
- 1—15" GLEASON.
- 1—18" OLIVER FACE MILL.
- 1—No. 1 SELLERS.
- 1—No. 2 SELLERS.
- 1—BX YANKEE.
- 1—No. 4 GALLMEYER & LIVINGSTON.
- 1—FISCHER PROFILE.
- 3—No. 1 LEBLOND.
- 2—No. 2 OAKLEY.
- 2—24" CINCINNATI FACE MILL.
- 1—STYLE W AMERICAN DRILL.
- 2—No. 1 EAMES DRILL.
- 1—MI GRAND RAPIDS TAP.
- 1—No. 21 OLIVER DRILL.
- 2—No. 41 OLIVER DRILL.

DISC GRINDERS (Double End)

- 3—No. 41 BESLY 20".
- 1—No. 51 BESLY 30".
- 1—No. 6 DIAMOND 26".
- 1—No. 3CB GARDNER 18".
- 1—No. 6 GARDNER 26".
- 2—No. 2 GARDNER 18".
- 2—No. 8DA HISEY WOLF 20".
- 1—No. 1 GARDNER 12".
- 1—GARDNER 25".

DISC GRINDERS (Opposed)

- 1—No. 26 BESLY 18".
- 2—No. 6 BESLY 20".
- 1—No. 84A GARDNER 22".
- 1—No. 27 GARDNER 22".
- 1—No. 85-16" GARDNER HYDR.
- 1—No. 14 GARDNER 16".
- 1—No. 123 GARDNER HYDR. 16".
- 1—STANDARD 36".

DISC GRINDERS (Miscellaneous)

- 2—No. 24-53" GARDNER HORIZ.
- 1—No. 86 GARDNER HORIZ. 30".

LAPPERS

- 12—IF NORTON.
- 2—IF BETHEL PLAYER.
- 7—IC BETHEL PLAYER.
- 2—23F BETHEL PLAYER.

LATHES (Production)

- 21—8" SUNDSTRAND STUB.
- 1—15" SUNDSTRAND STUB.
- 1—12" SUNDSTRAND STUB.
- 3—No. 6 LEBLOND MULTI-CUT.
- 1—No. 9 LEBLOND MULTI-CUT.
- 5—No. 12 LEBLOND MULTI-CUT.
- 16—14"x19" FAY AUTOMATIC.
- 1—14"x33" FAY AUTOMATIC.
- 4—GISHOLT SIMPLIMATIC.
- 2—MOD. R LO-SWING.
- 4—3 1/2"x36" LO-SWING.
- 3—3 1/2"x60" LO-SWING.
- 1—4"x15" LO-SWING.
- 10—4"x36" LO-SWING.
- 1—4"x60" LO-SWING.
- 3—7"x60" LO-SWING.
- 4—8"x60" LO-SWING.
- 2—1"x18" PRATT & WHITNEY.
- 1—9"x12" SUNDSTRAND GEARED HD.
- 4—9"x12" PORTER CABLE GEARED HD.
- 1—No. 3 LODGE & SHIPLEY DUOMATIC.
- 2—No. 1 L. & S. DUOMATIC.
- 1—11"x5" LEBLOND GEARED HD.
- 1—14"x5" LEBLOND CONE HD.
- 1—16"x6" LEBLOND CONE HD.
- 1—16"x6" SUNDSTRAND CONE HD.
- 1—No. 1 REED PRENTICE GEARED HD.
- 4—17"x5" LEBLOND GEARED HD.
- 1—17"x7 1/2" WICKES CONE HD.
- 1—17"x6" LEBLOND CONE HD.
- 1—17"x6" LEBLOND GEARED HD.
- 1—17"x8" LEBLOND GEARED HD.
- 1—17"x10" LEBLOND CONE HD.
- 1—17"x12" LEBLOND CONE HD.
- 1—20"x6" WICKES CONE HD.
- 1—20"x7 1/2" WICKES GEARED HD.
- 1—20"x7 1/2" WICKES CONE HD.
- 4—20"x4" SEBASTIAN GEARED HD.
- 1—21"x10" LEBLOND CONE HD.
- 1—21"x12" LEBLOND CONE HD.
- 1—22"x8" MONARCH GEARED HD.
- 1—18"x8" MONARCH GEARED HD.
- 2—13"x20" SENECA FALLS GEARED HD.
- 1—9"x12" SUNDSTRAND.
- 1—9"x12" PORTER CABLE.
- 1—12"x18" PORTER CABLE CARBO.

LATHES (Crankshaft)

- 1—No. 4AC LEBLOND CENT. DR., M.D.
- 1—No. 4AC LEBLOND D.E. DR., S.P.D.
- 1—LEBLOND UNIVERSAL, S.P.D.
- 1—WICKES UNIVERSAL, S.P.D.

LATHES (Turret)

- 2—No. 18 FOSTER GEARED HD.
- 1—No. 28 FOSTER TIMKEN HD.
- 1—No. 5 FOSTER GEARED HD.
- 1—No. 7 FOSTER CONE HD.
- 1—No. 7 FOSTER GEARED HD.
- 6—No. 3 FOSTER CONE HD.
- 1—24" GISHOLT CONE HD.
- 1—24-36" GISHOLT GAP CONE HD.
- 1—No. 2L GISHOLT TIMKEN HD.
- 1—No. 6 GISHOLT GEARED HD.
- 1—17"x8" LEBLOND G.H.
- 1—27"x12" LEBLOND CONE HD.
- 1—18" LIBBY GEARED HD.
- 1—26" LIBBY GEARED HD.
- 2—13" BARDONS & OLIVER GEARED HD.
- 1—No. 4 BARDONS & OLIVER CONE HD.
- 2—No. 1A WARNER & SWASEY TIMKEN HD.
- 2—No. 2A WARNER & SWASEY GEARED HD.
- 5—No. 3A WARNER & SWASEY GEARED HD.
- 1—4A WARNER & SWASEY.
- 8—No. 2 WARNER & SWASEY CONE HD.
- 2—No. 3 WARNER & SWASEY CONE HD.
- 9—No. 4 WARNER & SWASEY CONE HD.
- 3—No. 4 WARNER & SWASEY UNIV. C. H.
- 1—No. 4 WARNER & SWASEY TIMKEN HD.
- 5—No. 6 WARNER & SWASEY G.H.
- 2—No. 6 WARNER & SWASEY CONE HD.
- 3—No. 6 WARNER & SWASEY LONG BED C.H.
- 1—No. 6 WARNER & SWASEY LONG BED T.H.
- 2—30" GISHOLT GEARED HD.
- 2—No. 1F FOSTER FASTERMATIC TIMKEN HD.
- 1—No. 3F FOSTER FASTERMATIC TIMKEN HD.
- 2—No. 4 MOD. D. WOODS TILTED CONE HD.
- 2—No. 6 MOD. D. WOODS TILTED CONE HD.
- 2—2 1/4"x26" ACME FLAT CONE DR.
- 2—3 1/4"x36" ACME FLAT GEARED HD.
- 1—2 1/4"x24" JONES & LAMSON FLAT GRD. HD.
- 2—2-SPDL. JONES & LAMSON FLAT GRD. HD.

LATHES (Miscellaneous)

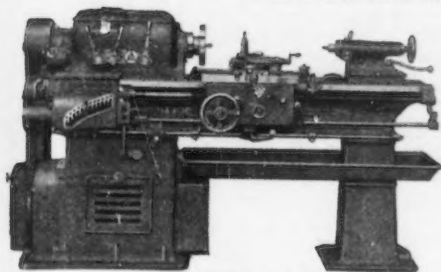
- 1—90" NILES WHEEL.
- 1—42" NILES WHEEL.
- 1—27"x12" BRIDGEFORD AXLE.
- 1—No. 2P P & J PISTON TURNING.
- 1—26" DAVIS PULLEY.
- 1—CINCINNATI PULLEY BORING.
- 1—30" PIT LATHE.

Every machine listed is in stock at our Chicago plants!

OF MACHINE TOOLS *Come and See*

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Listing to be continued—See January issue for Presses, Punches, Riveters, Rolls, Planers, Shapers, Slotters, Screw Machines, Shears, Swagers, Tapping Machines, Threaders, Upsetters, Welders, Etc.



LATHES (Engine)

- 1-12"x6' PRENTICE GEARED HD.
- 1-14"x6' HENDEY CONE HD.
- 2-14"x6' HENDEY G.H.
- 1-14"x6' LEBLOND CONE HD.
- 1-14"x6' LEBLOND GEARED HD.
- 1-14"x6' REED GEARED HD.
- 1-14"x6' REED GEARED HD.
- 1-16"x6' HENDEY CONE HD.
- 1-16"x8' HENDEY G.H.
- 2-16"x8' FAY & EGAN CONE HD.
- 2-16"x8' HENDEY CONE HD.
- 2-16"x6' PRATT & WHITNEY CONE HD.
- 1-16"x8' PRATT & WHITNEY CONE HD.
- 1-16"x9' CHARD CONE HD.
- 1-16"x8' SOUTH BEND CONE HD.
- 1-16"x10' HENDEY GEARED HD.
- 1-16"x25' MONARCH GAP GEARED HD.
- 1-17"x6' LEBLOND CONE HD.
- 1-18"x8' BOYE & EMMES CONE HD.
- 1-18"x8' FAY & EGAN CONE HD.
- 1-18"x8' CISCO CONE HD.
- 1-18"x8' AMERICAN CONE HD.
- 1-18"x8' SPRINGFIELD CONE HD.
- 1-18"x10' BOYE & EMMES CONE HD.
- 2-18"x12' BRADFORD GEARED HD.
- 1-18"x8' HENDEY CONE HD.
- 1-18"x10' CHAMPION CONE HD.
- 2-20"x8' HENDEY CONE HD.
- 1-20"x10' GREAVES KLUSMAN GEARED HD.
- 1-20"x10' PRENTICE GEARED HD.
- 1-20"x8' MONARCH CONE HD.
- 2-20"x10' HENDEY CONE HD.
- 1-20"x26' MONARCH TIMKEN H.D.
- 2-21"x8' LEBLOND G.H.
- 1-22"x8' LODGE & SHIPLEY GEARED HD.
- 1-22"x40'14' RAHN LARMON GAP CONE HD.
- 1-24"x10' PRENTICE GEARED HD.
- 1-24"x10' SOUTH BEND CONE HD.
- 1-24"x12' AMERICAN GEARED HD.
- 1-24"x16' SIDNEY GEARED HD.
- 1-24"x10' MONARCH CONE HD.
- 1-24"x40'14' McCABE GEARED HD.
- 1-24"x48'12' RAHN LARMON GAP CONE HD.
- 1-26"x16' BRIDGEFORD CONE HD.
- 1-26"x20' BRIDGEFORD CONE HD.
- 1-27"x16' LEBLOND CONE HD.
- 1-30"x12' MONARCH G.H.
- 1-30"x26' LODGE & SHIPLEY GEARED HD.
- 1-30"x13' WICKES CONE HD.
- 1-30"x11' H-S-G CONE HD.
- 1-32"x12' BRIDGEFORD GEARED HD.
- 7-32"x14' BRIDGEFORD GEARED HD.
- 4-32"x16' BRIDGEFORD GEARED HD.
- 1-36"x14' LODGE & SHIPLEY GEARED HD.
- 1-36"x22' BRIDGEFORD GEARED HD.
- 1-36"x38' BRIDGEFORD GEARED HD.
- 1-36"x16' PUTNAM DOUB. CARR. GRD. HD.
- 1-40"x15' POND CONE HD.
- 1-42"x24' PUTNAM GEARED HD.
- 1-56"x20' LODGE & SHIPLEY GEARED HD.
- 1-64"x25' BEMENT

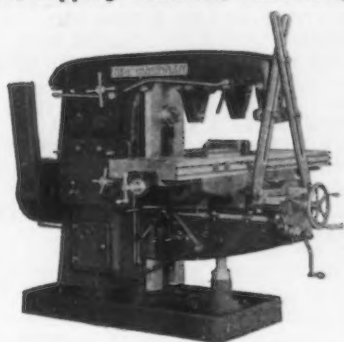
LATHES (Turning)

- 9-27"x10' BRIDGEFORD GEARED HD. Single or Double Carriage.
- 9-27"x12' BRIDGEFORD GEARED HD. Single or Double Carriage.
- 1-27"x16' BRIDGEFORD GEARED HD.
- 1-28"x18' LODGE & SHIPLEY GEARED HD.
- 1-30"x12' BRIDGEFORD GEARED HD. Double Carriage.

- 5-27"x14' BRIDGEFORD BORING GEARED HD.

LATHES (Double End Center Drive)

- 1-36" GREENLEE, M.D.
- 1-15"x56" SUNDSTRAND, M.D.
- 2-17"x56" SUNDSTRAND, M.D.
- 1-17"x78" SUNDSTRAND, M.D.



MILLING MACHINES (Plain)

- 3-2M CINCINNATI, RECT., OVER., M.D.
- 3-No. 2 CINCINNATI Rect. Over., M.D.
- 1-No. 1M CINCINNATI Rect. Over., M.D.
- 1-No. 2 CINCINNATI, M.D.
- 2-No. 2 CINCINNATI Rect. Over., M.D.
- 3-No. 3 CINCINNATI, M.D.
- 1-No. 35 CINCINNATI Rect. Over., M.D.
- 1-No. 3 CINCINNATI Rect. Over., M.D.
- 2-No. 4 CINCINNATI Rect. Over., M.D.
- 1-No. 4 CINCINNATI Cone Drive
- 1-No. 4 CINCINNATI, M.D.
- 1-No. 2 MILWAUKEE Timken Spdl., M.D.
- 1-No. 28 MILWAUKEE, M.D.
- 1-No. 3 MILWAUKEE MFG., M.D.
- 1-No. 3 MILWAUKEE Timken Spdl., M.D.
- 1-No. 3 MILWAUKEE HEAVY Tim. Spdl., M.D.
- 1-No. 38 MILWAUKEE Timken Spdl., M.D.
- 4-No. 38 MILWAUKEE, M.D.
- 1-No. 3 VAN NORMAN DUPLEX, M.D.
- 1-No. 2 KEMPSMITH MAXIMILL, M.D.
- 1-No. 4 KEMPSMITH MAXIMILL, M.D.
- 1-No. 3H LEBLOND Cone Drive.
- 1-No. 3 OHIO Rect. Over., M.D.
- 1-No. 2 RYERSON CONRADSON, M.D.
- 1-No. 3 RYERSON CONRADSON, M.D.
- 2-No. OY BROWN & SHARPE, M.D.
- 1-No. 0 ROCKFORD Cone Drive.
- 4-No. 1Y BROWN & SHARPE Cone Drive.
- 4-No. 1YB BROWN & SHARPE, M.D.
- 6-No. 2YB BROWN & SHARPE, M.D.
- 1-No. 2B BROWN & SHARPE, M.D.
- 1-No. 4 BROWN & SHARPE Cone Drive.
- 1-No. 4B BROWN & SHARPE, M.D.
- 1-No. 5 BROWN & SHARPE HEAVY, M.D.
- 1-No. 3B BROWN & SHARPE, M.D.
- 2-No. 2 BROWN & SHARPE Cone Drive.

MILLING MACHINES (Universal)

- 1-No. 4 CINCINNATI, M.D.
- 1-No. 2M CINCINNATI, M.D.
- 1-No. 2 BROWN & SHARPE Cone Drive.
- 2-No. 1D B & S Cone Drive.
- 1-No. 3 CINCINNATI Cone Drive.
- 1-No. 2A BROWN & SHARPE, M.D.
- 1-No. 3 BROWN & SHARPE Cone Drive.
- 1-No. 2H MILWAUKEE Timken Spdl., M.D.
- 1-No. 4 MILWAUKEE Timken Spdl., M.D.
- 1-No. 4 MILWAUKEE Timken Spdl., M.D.
- 1-No. 3 RYERSON CONRADSON, M.D.
- 1-No. 3A BROWN & SHARPE, M.D.

MILLING MACHINES (Vertical)

- 1-No. 3 CINCINNATI, M.D.
- 2-No. 4 CINCINNATI, M.D.
- 1-No. 4B MILWAUKEE, M.D.
- 1-No. 4K MILWAUKEE, M.D.
- 1-No. 2 MILWAUKEE, M.D.
- 1-No. 3 BECKER, M.D.
- 1-No. 5C BECKER Cone Drive.
- 5-No. 6 BECKER Cone Drive.
- 1-MOD. A82 BECKER, M.D.
- 2-D-1 BECKER, M.D.
- 1-No. 1 KNIGHT.
- 1-No. 3 KNIGHT.
- 1-No. 2 KNIGHT.
- 1-R. M. CLOUGH, M.D.
- 1-30" PRATT & WHITNEY, M.D.

MILLING MACHINES (Production)

- 14-No. 3 SUNDSTRAND RIGIDMILLS.
- 1-No. 3 SUNDSTRAND HYDR. RIGIDMILL.
- 1-No. 3 SUNDSTRAND VERT. SP. RIGIDMILL.
- 1-No. 30H SUNDSTRAND HYDR. RIGIDMILL.
- 1-No. 5 SUNDSTRAND RIGIDMILL.
- 1-No. 3W SUNDSTRAND RIGIDMILL.
- 1-No. 1405 MILWAUKEE SIMPLEX.
- 1-No. 2204 MILWAUKEE SIMPLEX.
- 3-No. 4-48 CINCINNATI PL. HYDROMATIC.
- 12-12" CINCINNATI PLAIN.
- 3-18" CINCINNATI PLAIN.
- 7-48" CINCINNATI PLAIN.
- 3-24" CINCINNATI PLAIN.
- 3-No. 13B BROWN & SHARPE PLAIN.
- 2-No. 30 DE Vlieg SUPERMILLS.
- 2-No. 31 DE Vlieg SUPERMILLS.
- 1-No. 32 KEMPSMITH PLAIN.
- 5-No. 33 KEMPSMITH PLAIN.
- 3-PUTNAM LINCOLN TYPE.
- 1-ROCKFORD VERT. HYD. FACING.
- 3-18" CINCINNATI DUPLEX.
- 3-24" CINCINNATI DUPLEX.
- 2-48" CINCINNATI DUPLEX.
- 1-No. 8 BECKER DUPLEX.
- 1-No. 2202 MILWAUKEE DUPLEX.
- 1-No. 1411 MILWAUKEE DUPLEX.

MILLING MACHINES (Rotary)

- 2-C28 NEWTON.
- 1-V4 NEWTON.
- 3-40" OHIO TILTED.
- 1-04 NEWTON DRUM TYPE.
- 2-INGERSOLL DRUM TYPE.
- 1-No. 1 DAVIS CONTINUOUS.
- 1-42" INGERSOLL CONTINUOUS.
- 1-No. 10 PRODUCTOMATIC (BILTON).
- 2-No. 45 PRODUCTOMATIC (BILTON).
- 1-60" INGERSOLL.
- 2-No. 2 MILWAUKEE.

MILLING MACHINES (Adjust. Rail)

- 1-24"x24"x18' INGERSOLL.
- 1-24"x24"x12' INGERSOLL.
- 2-24"x24"x10' INGERSOLL.
- 1-36"x24"x20' INGERSOLL.
- 1-24"x20"x6' INGERSOLL.
- 1-32"x36"x15' INGERSOLL.
- 1-No. 15 GARVIN.

MILLING MACHINES (Fixed Rail)

- 1-44"x24"x17' INGERSOLL.
- 1-28"x22"x14' INGERSOLL.
- 1-30"x22"x4' INGERSOLL.
- 1-42"x24"x5' INGERSOLL.
- 1-60"x20"x12' INGERSOLL.
- 1-60"x24"x18' INGERSOLL.

MILLING MACHINES (Openside)

- 1-INGERSOLL table 19"x73".
- 1-INGERSOLL table 30"x98".

MILLING MACHINES (Thread)

- 2-6"x14" PRATT & WHITNEY.
- 1-6"x48" PRATT & WHITNEY.
- 1-6"x80" PRATT & WHITNEY.
- 1-4 1/2"x12" PRATT & WHITNEY.
- 1-TAFT-PEIRCE.
- 2-No. 3 LEES BRADNER.
- 2-No. 12 LEES BRADNER.
- 1-No. 1 HALL PLANETARY.
- 1-TYPE D HALL DUPLEX PLANETARY.

MILLING MACHINES (Spline)

- 3-2" PRATT & WHITNEY DUP.
- 1-4" PRATT & WHITNEY DUP.

MILLING MACHINES (Hand)

- 5-No. 1 KENT OWENS.
- 3-No. 2 KENT OWENS.
- 3-No. 1 STANDARD.
- 2-No. 0 STEPTOE.
- 2-No. 1 SUPERIOR.
- 1-No. 1 TOLEDO.
- 2-No. 6 WHITNEY.
- 1-No. 2 BRISTOL.
- 2-No. 0 BRISTOL.
- 1-No. 0 BURKE.

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THE CLEARING HOUSE

HIGH QUALITY

Boring Machines, 5" bar N-B Floor Type
No. 2 Barrett, 5" bar, Extension Bed
No. 2 Coffman, 3 1/2" bar
No. 31 Lucas, 3" bar, Motor Drive
No. 1 Blomquist-Eck, 3 1/2" bar
No. 1 Cleveland, 2 1/2" bar

Boring Mills, 24" Bullard, "New Era"
30", 36" King
42" King, Solid Back, Belt Drive
42" King, Double Housing, Motor Drive
42" Gisholt
48", 54", 60" Colburn
60" Gisholt, Motor Drive
52", 72" King
72" Niles-Bement-Pond, Motor Drive
10" Niles

Drills, No. 2 Colburn, 3 & 4 spindle
No. 12 Colburn, 1 spdl.
No. D-4 Colburn, Heavy Duty
No. 314 Baker Heavy Pattern
No. 14 Niteco Multiple
No. 1, No. 3, No. 4 Baush Multiple

Radials, 3" Western, Plain
3" American Triple Purpose, Motor-on-Arm
4" Carlton, Plain
4" Western, Heavy Plain
4", 5" American Triple Purpose
6" Western, Plain
6" American, Plain
7", 8" Western, Heavy Plain

Gear Cutters, No. 1/2 Pfauter Hobber, M.D.
No. 1, No. 2, No. 3 Pfauter Hobber
No. 5-48" Brown & Sharpe
No. 2-60" Goss Hobber
Nos. 6, 61, 62, 624, 645 Fellows
18" Gleason Bevel Generator
No. 16HS, No. 24HS G. & E. Hobber
No. 18H Gould & Eberhardt Hobber

Grinders, Nos. 2, 2 1/2 Universal (Bath Type)
No. 70 Heald Internal
No. 16-26" Blanchard Vertical Surface
No. 16-A Blanchard Auto. Vertical Surface
No. 22-12" Heald Rotary Surface

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6"x32"	10"x72"	14"x96"
10"x18"	10"-15" GAPx72"	16"x50"
10"x24"	10"x96"	16"x72"
10"-15" GAPx24"	14"x36"	18"x96"
10"x36"	14"x50"	18"-24" GAPx96"
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20"x144"	23"x120"	

Lathes, 14"x8" Lodge & Shipley Geared Head
16"x8", 8" Lodge & Shipley, Taper Att.
16"x7" Lehmann Grd. Hd., Taper Att.
16"x10" American Grd. Hd., Relieving Att.
18"x8" L. & S. Grd. Hd., Taper Att.
19-38"x10" LeBlond Sliding Bed Gap
20"x10" L. & S. Grd. Hd., Taper Att.
22"x12" L. & S. Grd. Hd., Taper Att.
24"x12", 14", 18" L. & S. Grd. Head
24"x14", 16", 18" American Geared Head
27"x12" American Geared Head, M.D.
27"x18" Sidney, Taper Attachment
30"x11", 15" American Geared Head
30"x12" Lodge & Shipley
36"x20" LeBlond Hvy. Grd. Hd., Motor Drive
46"x30" Houston, Stanwood & Gamble, M.D.

Millers, Nos. 1-B, 2-B, 3-B Milwaukee Plain
No. 1-A, No. 2-A Milwaukee Plain
No. 2, No. 3 Cincinnati, Plain
No. 4-B Brown & Sharpe, Plain
No. 4 Cincinnati High Power Plain
No. 1-B Milwaukee Universal
No. 2 Brown & Sharpe Universal
No. 3 Cincinnati Universal, Root, Overarm
No. 2 Cincinnati High Power Vertical
No. 3-B Milwaukee Vertical
No. 5-B, No. 6 Becker Vertical
No. 4, No. 12 Lees-Bradner Thread
18", 24" Cincinnati Duplex
24"x24"x12" Ingersoll Adj. Rail
36"x36"x12" Newton Duplex

Planers, 24"x24"x6" Powell
24"x24"x12" Gray
30"x30"x6", 14" Gray
36"x36"x8", 18" Cincinnati
36"x36"x14"-24" Cleveland Open Side
42"x42"x30" N-B-P. Rev. Motor Drive
48"x48"x16" N-B-P
72"x48"x10" Cincinnati
72"x66"x16" Cincinnati

Turret Lathes, No. 6-2 1/2" W. & S. Screw Mach.
No. 5 Foster Univ., Timken Bearing, M.D.
No. 1-B Foster Universal
No. 1-A Warner & Swasey Univ., Air Chuck
No. 2-B Foster Univ., Timken Bearing, M.D.
No. 2-A W. & S., A.C. & R.F.
No. 3-A Warner & Swasey Universal, 4 1/4" H.S.
No. 3-B Foster Universal
No. 4-L Gisholt, Cross Sliding Turret

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ELECTRIC HOISTS
1—1-ton Yale & Towne and 2-ton Shepard with push trolley, 220 vo. 3 ph. 60 cy.
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WANTED

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Nickel-bearing Steel Scrap
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Federal Works Agency, Public Buildings Administration, Washington, D. C., Dec. 14, 1939.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Jan. 18, 1940, for construction of the U. S. P. O. at Ponton, Mich. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of \$5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

Federal Works Agency, Public Buildings Administration, Washington, D. C., Dec. 11, 1939.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Jan. 30, 1940, for construction of the U. S. P. O., etc., at Okanogan, Wash. Upon application, two sets of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of \$10 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

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